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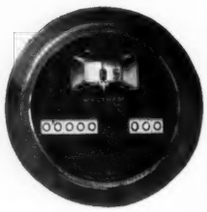

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLVI. NEW YORK—THURSDAY, FEBRUARY 23, 1922. No. 8

Domestic and Foreign Oil Reserves

Development of oil fields in Central and South America should result in wider use of gasoline propelled vehicles there and supplement our waning domestic supplies of crude petroleum. Present Mexican fields are thought to be nearing exhaustion.

By Herbert Chase

NEW YORK, Feb. 22.

THE sessions of the annual meeting of the American Institute of Mining and Metallurgical Engineers, devoted to consideration of domestic and foreign oil possibilities, which were concluded to-day, contained much that is of vital interest to the automotive industry. It is a well-recognized fact that the intensive development of automotive transportation is largely dependent upon an adequate supply of cheap liquid fuel. Without such a supply in this country, the use of all automotive apparatus would have been greatly restricted, as it has been to date in nearly all countries except the United States and Canada. Consequently the prospect of oil developments in South and Central America seems certain to help mightily the automotive market there.

Beyond this, and perhaps of greater importance to the industry, is the prospect that a supply of oil from countries to the south of our own, and including Mexico, which has recently supplied nearly one-quarter of our domestic oil requirements, will in time produce oil in sufficient quantities to materially augment our present domestic production. The cloud on the horizon is the probability that the most wonderful oil deposit the world has ever seen, that known as the Southern Mexican Field in the vicinity of Tuxpam, will soon cease to produce oil in considerable quantities, a large percentage of the pools in this field having already gone to salt water. This, of course, does not mean that Mexico will not still contribute great quantities of oil to the supply which this country and the world require, but the indications are that Mexico will fail to produce, at least for a period of uncertain length during which new Mexican fields are developed, anything like the proportion of the world's supply of oil which it has produced for the past few years.

In opening the symposium, Ralph Arnold, the chairman, stated that the aims of that session included:

1—The recording of as accurate an appraisal of the oil possibilities of the various countries as is possible, with information as to the immediate availability of their supply.

2—The furtherance of the efforts of the industry in securing governmental assistance in foreign oil development: (a) along the lines of a modification of our domestic oil policy, so that we can go to foreign countries and consistently ask fair treatment as to royalties and bonuses, and (b) by a closer co-operation between the State and Commerce departments and the oil industry.

3—The calling of attention to the unjustifiably drastic action of the price-fixing group of the oil in-

dustry during the last year or so, with the hope that it will use gentler methods in the future.

Continuing, Arnold said in part, "None of these subjects is new, and some of them have been up for discussion before various organizations for years. Our justification for again bringing them forward is the hope that industry, the Government and the people who shape the destinies of this country of ours may some time, somehow realize their importance and take effective constructive action.

"It is a source of great satisfaction to many of us here that the American oil industry has been awakened to a realization that the crude oil resources of the United States are not inexhaustible; that our crude oil should not be wasted, but should be conserved and used only for those purposes for which it alone is adapted; that every energy should be bent to improve our methods of refining, so that greater and greater percentages of gasoline, lubricants and other more desirable and valuable compounds may be made from the crude oil, rather than dissipated as fuel.

"Walter Teagle has endeavored to show by statistics that the foreign imports of oil (meaning Mexican oil) have little effect on the price of our light domestic crude. Mr. Teagle's case is greatly weakened by the fact that the price-fixers knocked 70 per cent from the price of mid-continent crude when the great glut of Mexican oil loomed last winter as a menace to our domestic industry, but began raising the price again immediately it dawned on the fixers that most of the proved Mexican fields were doomed to speedy exhaustion. This erratic manipulation of the price caused the ruination of many small operators and independents with a corresponding advantage to the stronger oil companies.

"Again referring to Mexico, may we not say that the oil industry there is 'between the devil and the deep blue sea'—meaning, of course, the tax problems on one side and salt water on the other? Unfortunately, the predictions made from this platform just a year ago have proved all too true."

The Oil Reserve of the United States

Following the introductory remarks of the chairman, Dr. David White, Chief Geologist of the United States Geological Survey, presented a paper on the oil reserves of the United States, in which he gave in considerable detail the results of the survey recently completed by the Survey in co-operation with the American Association of Petroleum Geologists. A brief summary of this estimate of reserves was given in Joseph E. Pogue's article on the Trend of the Petroleum Industry in 1921, which was printed in last week's issue of AUTOMOTIVE INDUSTRIES. Some of the important points brought out by Doctor White are given below:

A review of the producing, probable and possible oil-bearing regions in the United States has resulted in an inventory estimate that 9,000,000,000 barrels of oil recoverable by methods now in use remained in the ground in this country Jan. 1, 1922.

Unlike our reserves of coal, iron and copper, which are so large that apprehension of their early exhaustion is not justified, the oil reserves of the country, as the public has frequently been warned, appear adequate to supply the demand for only a limited number of years. The annual production of the country is now almost half a billion barrels, but the annual consumption, already well beyond the half-billion mark, is still growing. For some years we have had to import oil, and, with the growth in demand, our dependence on foreign oil has become steadily greater, in spite of our own increase in output. It is, therefore, evident that the people of the United States should be informed as fully as possible as to the reserves now left in this country, for without such information we cannot appraise our probable dependence upon foreign supplies of oil, on the expanding use of which so much of modern civilization depends.

How U. S. Reserves Are Calculated

Fortunately, estimates of our oil reserves can be made with far greater completeness and accuracy than ever before. During the last eight years a large part of the territory in the United States that may possibly contain oil has been studied in great detail by oil geologists; wildcatting has spread through "prospective" into many regions of "possible" and locally even into regions of "impossible" territory; old fields have been definitely outlined and new ones discovered, and, finally, improvement in methods and special training in the calculation of oil reserves and of the depletion of oil properties have been developed to meet the requirements of the tax laws. Many oil companies also furnished confidential data for use in the preparation of estimates.

The calculations of the oil reserves in the proved and discovered fields are reasonably reliable, and those for regions regarded by the geologists as embracing "probable" future oil fields are based on all the available data and are entitled to high respect, but the committee wishes it most clearly understood that the estimates of oil in "possible" territory are absolutely speculative and hazardous and that, although they represent the best judgment of the geologists, they nevertheless may be, at least in part, wildly erroneous. The questions involved are not only how much a particular doubtful region will yield, but whether it will furnish any oil whatever. On the whole, the estimates are undoubtedly the best that have ever been made for the United States, and better than have hitherto been prepared for any oil country or district of the world.

Of the total estimated oil reserves of the United States, amounting in round numbers to 9,000,000,000 barrels, 5,000,000,000 barrels may be classified as oil in sight and 4,000,000,000 barrels as prospective and possible. Rather more than 4,000,000,000 barrels should be assigned to the heavy-oil group. These oils will be recovered mainly in the Pacific Coast, Rocky Mountain and Gulf states. The contents of the Lima-Indiana region, which yields oil of a distinctive type, are estimated at 40,000,000 barrels. In general, the so-called paraffin oils of moderate and high grade, as contrasted with the heavier oils, amount in all to about 5,000,000,000 barrels. The estimated reserves of high-grade oils of the Appalachian States are about 725,000,000 barrels.

Inadequacy of Domestic Reserve

The estimated reserves are enough to satisfy the present requirements of the United States for only 20 years, if the oil could be taken out of the ground as fast as it is wanted. Should these estimates fall even so much as 2,000,000,000 barrels short of the actual recovery, that error of 22 per cent would be equivalent to but 4 years' supply, a relatively short extension of life. However, the committee expressly decries the too frequent assumption that inasmuch as the estimated reserves appear to be sufficient to meet the needs of the country at the present rate of consumption for 20 years, therefore the reserves will be exhausted at the end of that time or, at most, a few years later. This assumption is absolutely misleading, for the oil pools will not all be found within that length of time, drilling will be spread over many years, as the pools are found, and the wells cannot be pumped dry so quickly. Individual wells will yield oil for more than a quarter of a century,

and some of the wells will not have been drilled in 1950. In short, the oil cannot all be discovered, much less taken from the earth, in 20 years.

Our Dependence on Foreign Oil

The United States is already absolutely dependent on foreign countries to eke out her own production, and if the foreign oil can be procured, this dependence is sure to grow greater and greater as our own fields wane, except as artificial petroleum may be produced by the distillation of oil shales and coals, or some substitute for petroleum may be discovered.

All the estimates except those for one region, noted below, include only the oil recoverable from the ground by present methods, but it is practically certain that the percentage of oil to be recovered from the American oil fields will be vastly increased by the application of new and improved methods of recovery. At present, however, this phase of production may be regarded as in the experimental stage. Little has been definitely determined as to the applicability of "air pressure," "water drive," "gas pressure," "vacuum extraction" and other new methods to different regions, with their variation in conditions, or to the increase in production to be counted on from the use of these methods. The committee, therefore, feels that at present any estimates of such possible additional recoveries would probably contain errors enormously greater than those inherent in the estimates made on the basis of methods now in use. In only one region are the geologic conditions so well known and the experience with improved methods on a commercial basis so extensive and so long continued as to justify the formulation of estimates based on the results obtained. This is the region in northwestern Pennsylvania and southwestern New York, where the "water drive" is now employed to obtain oil from the Bradford sand, which was supposed to be largely exhausted. Under the peculiar conditions there the use of this method will result in the recovery of a large quantity of oil that cannot be recovered by ordinary methods of production. Allowance for the additional oil thus recovered has, therefore, been made in the estimates. It has already been found, however, that this method is not applicable to some other districts, and accordingly no allowance has been made for possible additional recovery through its use where its suitability to the local conditions has not been actually demonstrated.

In the light of these estimates as to the extent of our supplies of natural petroleum, the joint committee points out the stern obligation of the citizen, the producer and the Government to give most serious study to the more complete extraction of the oil from the ground, as well as to the avoidance of waste, either through direct losses or through misuse of crude oil or its products.

The Mexican Situation

The paper of V. R. Garfias, which followed that by David White, dealt at length with the oil situation in Mexico and testified to the fact that the last of the producing pools in the great Southern Field, pools which to-day are producing about two-thirds of the total Mexican output, will in all probability run to salt water in about three to five months, thus taking from our domestic market, almost over night as it were, some 10 to 15 per cent of its supply of crude. This prospect, of course, makes it exceedingly important that every effort be made to supplement our domestic supply from other foreign sources, and it was largely because of this that the meeting was held.

There are few who doubt that large supplies of oil will still be brought to the surface in Mexico, but the possibilities of finding another field which will be such a phenomenal producer as that which has now largely gone to salt water is extremely remote, and even if such a field be found it will require years for its development. It appeared from Garfias' paper that there are excellent possibilities of further discoveries of oil in Mexico, but, as David White pointed out, these fields are quite likely to be more like the average field in this country in which the yield per well is usually relatively small, so that much time is consumed in drilling, even when the field has been discovered and is in a relatively accessible location, as the Mexican fields of the future are not apt to be.

Estimates of Reserves Are Speculative

In the case of Mexico, as with practically all other countries, except the United States, and even to some extent with our own country, there is a considerable element of speculation in figures given in connection with oil reserves. This is due in part to the fact that such estimates are dependent to a very large extent upon careful geological investigations which, in the case of the South and Central American countries, have been made only in limited areas, if at all. For this and other reasons it is largely guesswork to attempt to give figures for the oil reserve of these countries. It is a well-known fact, however, that the geological formation and some other surface indications, in respect to Mexico, indicate that much oil will still be found there, although the time required for its development will be, as pointed out above, very considerable, owing to the inaccessibility of the potential supplies and the fact that much time is required for drilling operations, the construction of pipe lines and the development of other transportation facilities, even after oil in commercial quantities has been definitely located.

The sharp decline in Mexican production which is expected to occur by or before the middle of this year is practically certain to be reflected in the American market conditions, even though such an occurrence has already been discounted to a considerable extent.

Mexico produced in 1921 approximately 200,000,000 barrels, of which about 86 per cent were exported, the bulk of this export, or about 73 per cent, was brought into the United States.

Owing to the enormous production of the two or three remaining pools in the Southern Mexican field, Mexican production for the present year is continuing at a high rate. It was pointed out by Garfias that efforts are now being made to open new pools in the southern field, but Arnold stated that such developments are apt to decrease rather than increase the time which will elapse before the southern field is exhausted, since the various pools are operated on a competitive basis and are thought to tap the same general reservoir.

Canadian Oil Possibilities

The situation with respect to oil production in Canada was covered in a brief paper by Chairman Arnold, who stated that the figures given are of a decidedly speculative nature, being based upon the assumption that the Canadian fields may be expected to produce in quantities approximately the same as those produced in American fields in which the territory is of a similar geologic formation.

Arnold stated that there are now two areas in which oil is produced in Canada. The first is located in Southern Ontario and produces in the neighborhood of 200,000 barrels annually. The other producing district is in the southern part of the Province of Alberta, which is in reality a continuation of the Montana oil fields in this

country. This district has only a few wells, which have produced about 12,000 barrels of oil annually for the last five years. The chief hope of Canada, however, lies in the reserves of the western provinces, including in particular Alberta and British Columbia, but since these reserves cannot be accurately estimated from the relatively meager information available at the present time Mr. Arnold requested that the figures he gave be not quoted.

In discussion of Arnold's remarks one of the speakers who had had considerable experience in Canadian fields brought out the fact that investigations to date indicate the presence of oil over an area of some 300 miles wide from east to west and extending northward from the American border practically to the Arctic circle. The possible production from this area cannot be even roughly estimated owing to the fact that only extremely small portions have been drilled. It is probable, however, that Canadian reserves are large as compared to most other American countries except the United States, although even approximate information in respect to reserves is not available for many areas in Central and South America which are thought to have potential possibilities.

West Indies and Central America

Papers on the possibility of oil production in the West Indies and Central America (Mexico and Trinidad excluded) prepared by A. H. Redfield were read by others in the absence of the author. These had to do largely with the geological formations supposed to contain petroleum deposits, since little if any production of petroleum is now obtained from these regions. Oil is thought to exist in relatively negligible quantities in Cuba, but the prospects for development there are remote. Some wells have been drilled in Santa Domingo and Hayti, but none of these have reached any considerable depth and do not show any great possibilities, although small quantities of oil have been obtained.

Concerning Central America, it is impossible to give even the roughest approximation. Guatemala and British Honduras are thought to contain petroleum deposits, while Costa Rica and Panama include certain territory from which more or less oil may be obtained at some future time. The tropical conditions which exist in these regions, however, render prospecting difficult and enormous expenditure of capital will be required to develop oil fields and transport the crude product to the seaboard even when oil has been found to exist in commercially available quantities.

There was considerable discussion as to the likelihood of oil production in quantity in Colombia, which is considered by some to have great possibilities. This is due in part to the fact that oil seepages occur over a considerable area. While this no doubt indicates a certain oil reserve, some speakers took the view that the seepages had resulted in the loss of considerable oil which might otherwise be recovered by the drill. Others considered that Colombia is one of the greatest potential oil producing countries of the world, although the problems of production and transportation, and the present prohibitive laws in reference to development, are serious handicaps. One speaker stated that the Standard Oil Co. has built a railroad into one oil promising section and shipped enormous quantities of material for use in development work.

Venezuela and the Guianas

Ralph Arnold and B. Bryan presented a brief paper outlining the possible future production of oil in Venezuela, which is thought to contain some of the most extensive petroleum deposits in South America. Enormous tracts of territory are believed to overlay deposits which will no doubt in time be developed, but the cost of securing oil from most of this territory is now too great to enable serious competition with more accessible fields. Quite a number of wells are already producing oil, both in Venezuela and Trinidad, but the total production is insignificant as compared with that of Mexico and the United States. The authors of this paper stated that the Guianas may be eliminated from consideration at the present time, although detailed geological studies in the future may bring to light the existence of oil in commercially recoverable quantities.

Other papers dealing with oil possibilities in Bolivia, Brazil, Argentina and Chile were scheduled for presentation at a session held too late for a report to be here given.

Future Demands for Petroleum in U. S. A.

Joseph E. Pogue, at a session devoted to a Symposium on Petroleum and Gas, presented a paper entitled, Future Demands on the Oil Industry of the United States, in which he uses the same method of predicting the future demand for gasoline developed and used by R. B. Prescott, of the Class Journal Co., in an article on the future growth in the use of passenger cars in the United States which appeared in AUTOMOTIVE INDUSTRIES for Nov. 17, 1921. The following conclusions are taken from Pogue's paper:

1. The demand for crude petroleum for the next ten years will be determined by the growth of automotive transportation and the motor-fuel requirements resulting therefrom.

2. Future consumption of crude petroleum and its products may be estimated by methods of empiric projection, and the results attained by such methods are given, but such methods are not regarded as satisfactory.

3. Two rational methods of forecasting the demand for gasoline are described and applied, and a method involving the principle of diminishing returns is advanced as the most satisfactory approach to the problem.

4. By means of the method involving the principle of diminishing returns, the domestic demand for gasoline is estimated to be 6800 million gallons in 1925 and 8300 million gallons in 1930.

5. The ratio between the quantity of crude petroleum consumed and the quantity of gasoline produced is empirically projected by fitting a straight line to the data by the method of least squares, and according to this method 27.7 per cent of our crude petroleum consumption will be converted into motor fuel service in 1925 and 33.9 per cent in 1930, as contrasted with a percentage of 19.9 for 1920. This projection is subject to a greater probable error than the estimate of gasoline requirements.

6. Combining the results mentioned in the two preceding paragraphs; the estimated demands for gasoline in 1925 and 1930 are converted into demands for crude petroleum. The results attained indicate that 585 million barrels of crude petroleum will be sufficient to support automotive transportation in 1925 and 580 million barrels will be sufficient for 1930, on the basis of a continuation of recent progress in technology.

7. The results attained are subject to more accurate determination on the further development of the methods followed, but the present results are advanced as having sufficient probability to be of practical value as a basis of present planning.

ACCORDING to German patent No. 314,175, purification of used oil is effected by producing a syrup-like solution of glycerine pitch (a by-product of glycerine production) and water (4:1) and mixing 100 parts of the used oil with five parts of the solution and ten parts of water. Upon boiling this mixture, a sort of milk is produced, on top of which the purified oil separates out while impurities and water sink to the bottom.

Tractor Show Marked by New Designs

Many new engineering features were presented at the tractor show. Activity in creeper tractor construction. Road building and maintenance tractors are prominent. Corn belt and grain belt tractor requirements contrasted. New machines and parts described in this analysis of recent tractor show. Tractor session of S. A. E. develops interesting discussion.

By P. M. Heldt

IF this year's tractor show was not a striking success from the standpoints of representativeness and attendance, it at least offered a considerable percentage of new designs. Most of these designs were the products of new firms. Older firms with an established business could perhaps afford to ignore the show, in view of the low ebb in the buying power of the farming community, but firms just entering the industry could not afford to miss the best opportunity of the year to bring their products before the public.

Considering the relative number of creeper type tractors on the market and the number sold in the course of a year, this branch of the industry was better represented than the wheeled tractor branch. Creeper type tractors exhibited included the Holt, Best, Monarch, Cletrac, Bear, Bates, Henneuse and Avery. These machines, at least the heavier models among them, are largely used for road building, a line of work in which there is a great deal of activity just now. The use of creeper tractors in road construction and road grading was played up in the moving picture exhibits connected with the show and was also emphasized during the road construction session of the S. A. E. Another field in which the creeper type of tractor is extensively used is that of snow removal, and a somewhat novel type of snow plow was shown on the stand of the Monarch Tractor Company. The tractor was a quite large one and was fitted in front with a snow plow having the appearance of the prow of a battleship. This was of slightly greater width than the tractor itself. In addition to this plow the tractor carried wings on both sides, which could be either swung out to form extensions of the two sides of the regular plow, thus clearing a path through the snow 18 ft. in width, or else could be drawn in close to the tractor so as to be ineffective. The idea is to use the wings in newly fallen, light snow and the plow alone in packed and frozen snow.

Few Motor Cultivators

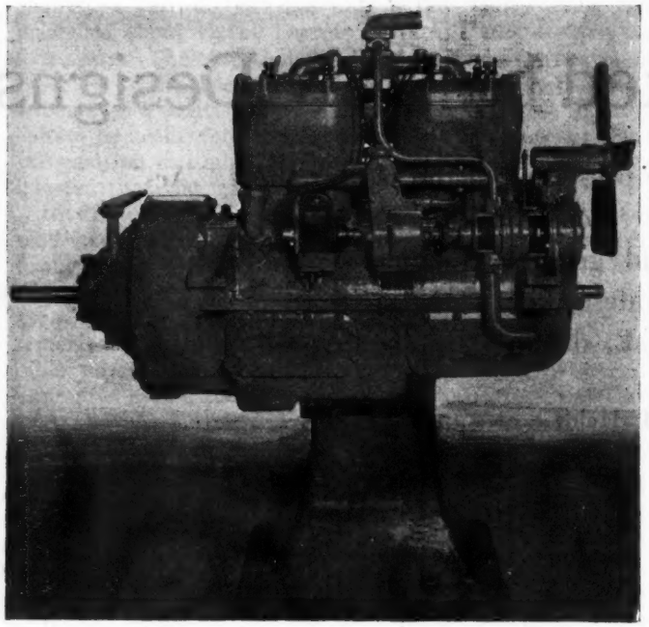
There was an almost total absence of the motor cultivators which have been such a conspicuous feature of recent tractor shows. This may be partly accounted for by the fact that the show was held in a center of the grain belt, where row crops are not raised to any great extent. On the other hand, there were two representatives of what may be regarded as a new type—a machine primarily designed for cultivating, but which can also be used for plowing. The two machines referred to are the Cletrac Model F and the Parrett Cultor. The field which these small tractors are to serve was discussed in a paper by G. D. Jones, engineer of the Cleveland Tractor Co., read at the technical session of the S. A. E. meeting. Mr. Jones pointed out that the big volume of sales must come from the small farms, those between 50 and 200 acres. In the corn belt the average farm contains only about 150 acres, and the farms in the East are still smaller. These are diversified crop areas; in the corn belt, for instance, the farmer always grows some grain, as well as potatoes and hay. This means that he must use many types of implement. Mr. Jones pointed out that this situation—the small size of the average farm combined with the great variety of implements required—made it necessary for the tractor manufacturer to thoroughly study the implement problem. Farmers must not be overburdened financially with the purchase of implements, and Mr. Jones expressed the view that the tractor makers would have to produce the implements to go with their tractors themselves, which his firm has already started to do.

Multi-Purpose Machines

A somewhat similar argument is advanced by the Parrett company, which also realizes that the necessity of buying a long list of expensive implements is likely to be a great deterrent to the would-be purchaser of a tractor. Parrett's solution of the problem, however, is not to go into the implement business himself, but to make use of the implements already on the farm. His Cultor is designed to fit the 2-horse plow found on practically every farm, and it also fits the ordinary horse cultivator.

In the discussion at the S. A. E. meeting some of the speakers took a long range view of tractor development, while others limited the bearing of their remarks to the possibilities and probabilities of the immediate future. One speaker, for instance, mentioned that there were other more efficient methods of loosening the soil and preparing it for the seed than the moldboard type of plow; this implement, he claimed, was designed to fit the horse, a draft animal, which could do mechanical work most efficiently when pulling in a straight line. There were other examples in tractor work where we did not take full advantage of the possibilities of our power source. In grass mowing and in grain harvesting, for instance, we started with mechanical power transmitted by a revolving shaft, then converted this into a straight-line draft, and obtained rotary motion for the operation of the sickles by the use of bull wheels on the implement.

This line of argument did not seem to meet with a sympathetic reception, however. It was pointed out that there had been tilling machines with rotary tools developed in the past, but that in every case they had proven commercial failures. The trouble was that it was too difficult to get the farmer to give up his accustomed method of doing his work.



Climax tractor engine adapted for industrial purposes

On the other hand, the idea that it is necessary to make the tractor a machine of greater utility to the farmer, to make it more nearly universal in its applications, is getting possession of the minds of tractor men. One of the speakers at the S. A. E. discussion said that 45 per cent of the total acreage of the country was planted to row crops, and this gave a good idea of the necessity for multi-purpose machines. Our present conventional tractor was a plowing and belt-work machine, and while it was suitable for the wheat belt it did not meet the requirements of diversified farming. So long as we failed to develop a universal machine we would not get very far in motorizing the farm.

Other speakers brought out the fact that there is room for both types of machine—the large tractor for the bigger farms on which most of our staple grains are produced and the small, multi-purpose machine for the smaller farms devoted to diversified crops. On the big grain farms a single purpose tractor is required. One of the engineers taking part in the discussion even went so far as to say that there is a decided demand for a larger unit in the grain belt—as large as one man can handle. This argument was countered by the other side with the statement that farms of this class were relatively few in number, and that volume sales must come from the small farms.

Contract Plowing on the Coast

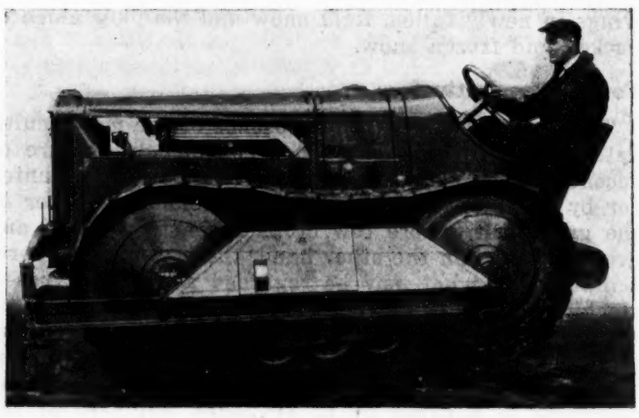
The suggestion was made that if plowing constituted a relatively small fraction of the work in the corn belt and in the East, why didn't the farmers in these sections form co-operative organizations which could buy one large tractor each, with which to do the plowing of the community. A call for the relation of any experiences along this line brought no response, but it was stated that contract plowing enterprises had met with considerable success in California.

The importance of the correct hitch in plowing was emphasized in a paper read at the meeting by Oliver B. Zimmerman of the International Harvester Co.'s engineering department. This paper was of an analytical character and also contained the results of a good deal of experimental work. It was shown that the plow draft can be increased by as much as 25 per cent by having the drawbar hitched to the tractor at the wrong point. For instance, by connecting the drawbar too far to the left, the plow is forced against the land slide with considerable force, and the friction is greatly increased. The height of the drawbar hitch is of equal importance.

Interviews with farmers at the show threw a number of interesting sidelights on the present agricultural situation. It must be obvious to every one that the high prices of agricultural products during the five years previous to 1921 brought great wealth to the agricultural community; but they also brought an inclination to speculate. The same as in the stock market trading is always brisk as long as the market is rising to higher levels, so people were tempted to buy farms or rent farms, almost irrespective of the prices or rents asked, as long as the prices of farm products kept on soaring. During those years many of the older farmers retired, making way for younger men who thought they could see a long period of prosperity ahead and were willing to assume the risk necessary to capitalize the situation as they saw it. "Land hunger" grew so strong that farm values were forced up to three or four times the figures quoted for the same land only a decade earlier, and in some sections the bankers refused to take further mortgages on farms because they foresaw that when the slump came the security would not protect them if the loans were based on the prices then paid.

Reasons for Depression in Tractor Market

It is not hard to see why many of the people who started farming during the inflation period should have quickly come to grief when deflation set in and the prices brought by farm products slumped abruptly. The situation of many of the older renters is probably not much better. When the prices of farm products began to tumble, it was not long before those who had entered farming under the conditions outlined were financially embarrassed, because their expenses decreased but slowly or not at all. One result of this was that many farmers were compelled to sell their cattle without fattening them and sometimes only half grown, in order to raise cash that was badly needed. In this way the country's supply of livestock has been materially reduced, and the consequences are already making themselves felt in increased prices of hogs and cattle. The prediction was made by one farmer at the show that this would mark the turning point in the economic situation of the farmer. Better prices will be paid for livestock during the next few years, and, besides, as it will be necessary to feed much corn, etc., in order to bring back the country's stocks of hogs and cattle to their normal size, the outlook is that cereal products, too, will not long remain at their present low prices.



Bear creeper tractor

The writer has been informed that the agricultural college of a leading Western State recently made a report on the comparative fuel value of corn and coal, on the basis of the ruling prices, and in this the conclusion was reached that a bushel of corn would yield just about as much heat as the amount of coal the farmer could buy for it. The comparison was made some time ago when corn sold in that state at less than 20 cents a bushel. It is hardly necessary to point out that when coal cannot compete with corn as a source of energy, gasoline does not stand very much chance.

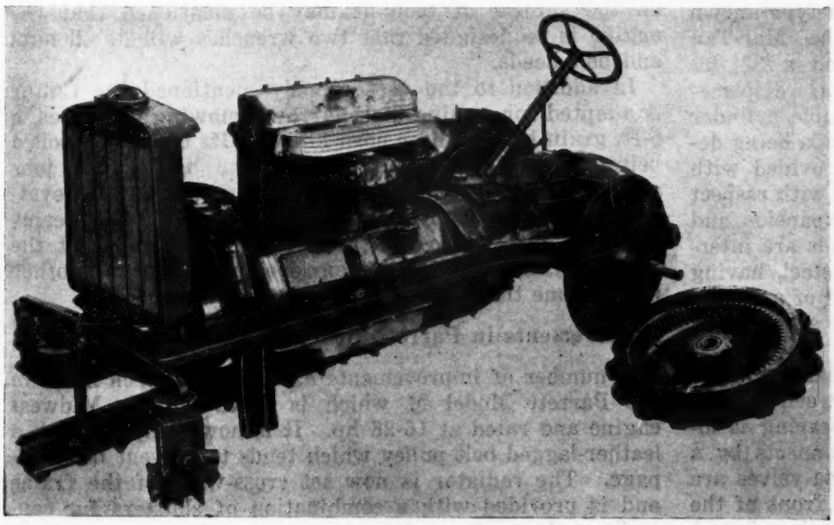
The above depicts the dark side of the present situation affecting the farm tractor industry. Fortunately, there is also a bright side. As pointed out by one tractor farmer returning from the show, every farmer's boy in the country between the ages of 16 and 21 wants his dad to get a tractor, because it would shorten his hours of hard work, and because he likes to tinker with machinery, particularly power-driven machinery. The older generation of farmers are conservative and cannot be easily induced to give up their old ways of doing their work, but the younger generation, who are growing up in daily contact with gasoline engines and automobiles, have a natural bend toward the tractor and will give it every chance.

Following are brief descriptions of new machines exhibited at the show and notes on improvements made by manufacturers who continue their old models.

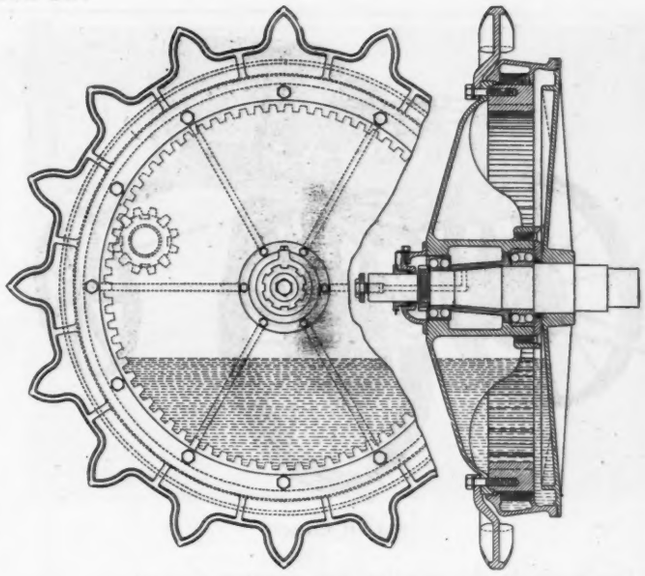
Bear Creeper Tractor

Among the new tractors exhibited was the 25-35 hp. Bear, a creeper type manufactured by Bear Tractors, Inc. The special advantages claimed for this design are its low weight as compared with other creeper tractors of similar capacity, high mechanical efficiency, compactness and accessibility. The net weight is 5500 lbs., and the weight in operating condition, 6000 lbs., which results in a ground pressure of from 3.5 to 3.9 lbs. per sq. in. An efficiency of 75 per cent is claimed, that is, 75 per cent of the engine brake horse power is available in drawbar horse power. The compactness may be judged from the following overall dimensions: Length, 118 in.; width, 60 in.; height, 54 in. The turning radius is given as 6 ft.

An interesting feature resides in the track and roller construction. The weight of the tractor is transferred to the track by means of three rollers; these rollers, however, are not rigidly held on the track frame, as is usually the case, but support the frame through the intermediary of



Mechanical parts of Bear tractor



Drive gear lubrication of Bear creeper tractor

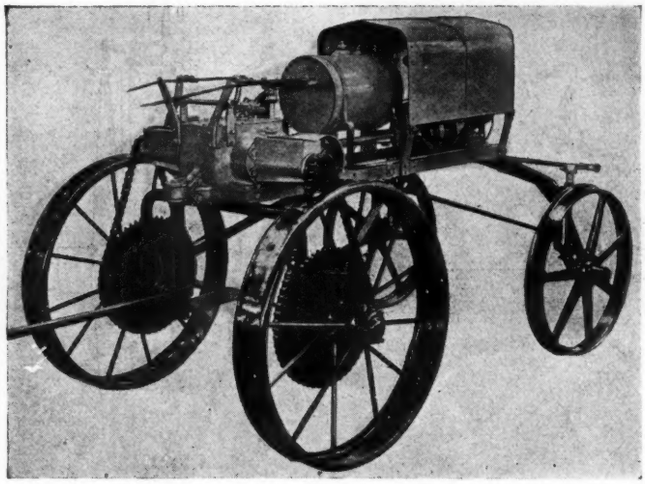
levers and coiled springs. This results in a more or less equal distribution of the pressure on the track as well as in relieving of shocks over the tractor. At the forward end the track frames are connected through double coiled springs to a cross bar pivoted at the center of the tractor frames.

The engine is a Stearns 4¾ x 6½ in., operating at a governed speed of 975 r.p.m. Engine accessories include a Bosch magneto with impulse starter, a Stromberg carbureter, Simplex governor and Spirex radiator. A tank capacity of 45 gal. is provided. Through a Borg & Beck clutch the power is transmitted to the 2-speed and reverse sliding gear transmission with chrome nickel steel, coarse pitch, wide faced gears. Each track is controlled individually through a dry multiple disk clutch of Bear design. These clutches are 19 in. in diameter. All transmission mechanism is completely inclosed and all shafts are mounted on ball bearings, to which is ascribed the high mechanical efficiency claimed.

Drop forged units constitute the track. They are claimed to be easily detachable and they run dry or without lubrication. Knife-edge, drop forged grousers are attached for road work. The ground contact area of each track measures 64 x 12 in., this giving the unit pressure previously mentioned. The machine is geared for speeds of 2¾ and 1½ m.p.h. forward and 1.2 m.p.h. reverse. Steering is effected by means of a handwheel which connects to the track clutches. It is claimed that a very light effort on the wheel suffices to control the machine. A standard belt pulley of 9 in. diameter and 9 in. face is mounted on the rear of the transmission case.

Parrett Combined Tractor and Cultivator

A most interesting machine is the new Cultor of the Parrett Tractor Co. It is a small machine designed to do all farm operations with implements already on the farm; that is, horse-drawn implements. Several conversion features are embodied in the design. Thus, it is either made with a high ground clearance suitable for cultivating corn when quite high, or as a "low down" tractor with 17 in. clearance which is preferable where the conditions



Parrett Cultor

of the work do not require any greater clearances. This is not a conversion feature in the sense that the farmer can change the machine from one type to another, but rather in the sense that the manufacturer takes the same power plant and frame and provides it either with arched axles and a vertical chain drive to the rear wheels for high clearance, or with straight axles and an internal gear drive to the rear wheels. The "low down" type is especially suited to orchard work.

The other conversion feature referred to relates to the steering mechanism. Either a line drive can be used or the ordinary wheel steering with seat directly on the tractor. Both the line drive and the steering post with wheel are furnished as standard equipment and can be quickly interchanged in accordance with the type of implement used.

The machine can be used as a cultivator for corn and other row crops and a one-plow tractor. An ordinary horse cultivator is hitched to the rear of the transmission box. There is also furnished as regular equipment an adjustable drawbar hitch which bolts to the inner ends of the stub rear axles or the axle spindles on the high clearance job and also fastens to the rear of the transmission housing. This adjustable hitch attachment comprises a vertical bar or tube on which the hitch clevis can be moved up and down, and be locked at any height by a set screw.

Has Mar-Tan Air-Cooled Engine

The engine is a two-cylinder Vee air-cooled type known as the Mar-Tan engine, a product of the Mar-Tan Motor Mfg. Co. It has a 3⅜-in. bore and a 3⅞-in. stroke, giving it just under 70 cu. in. displacement. The valves are located in the detachable cylinder heads parallel with the cylinder axes. The heads being detachable, the cylinder castings, which are provided with deep and thin cooling flanges, are symmetrical with respect to their axes, which tends toward uniform expansion and contraction. Cylinder castings as well as heads are interchangeable. The cylinders are cast of semi-steel, having a Brinell hardness of 220 to 250, and the heads of a special grade of iron known as Mayria iron, which has special heat resisting qualities.

The crankshaft is supported on three ball bearings while another bearing is used on the crankpin. Between the two ball bearings on the rear main crankshaft bearing is located the centrifugal type governor which connects by a simple linkage to the carbureter throttle. The valves are operated through push-rods extending up the front of the cylinders from a cam mechanism inclosed in a housing at the forward side of the crankcase.

Fuel is carried in a cylindrical tank mounted on strap iron supports between the engine and transmission. Ignition is by a magneto mounted on a pad on the engine and driven by a train of spur gears from the crankshaft. Cooling is assisted by an airplane type fan mounted midway between the two cylinder heads.

A three-plate clutch of Parrett design is combined with the engine. The central driving plate is secured to the flywheel rim and the two driven plates to a spider carried by the clutch shaft, which latter has a ball bearing pilot on the end of the crankshaft. The clutch is ordinarily held in engagement by a spring but can be disengaged either by a lever or by the steering lines. The ends of the steering lines fasten to levers on a shaft connected through a lever and link mechanism to the clutch throwout collar and the lines pass over pulleys at the ends of the steering lever, with the result that the motion of the hand in line steering is reduced by one half at the end of the steering lever and only very little pull on the lines is required for steering. If the operator pulls fairly hard on both lines the anchorages of the steering lines are pulled forward and the clutch is thereby disengaged. A certain amount of slack is provided in the clutch throwout collar so that the ordinary pressure on the steering lever does not cause friction at this collar. There is also a connection between the clutch throwout collar and the throttle valve so that whenever the clutch is opened the engine is automatically throttled down.

Only One Forward Speed

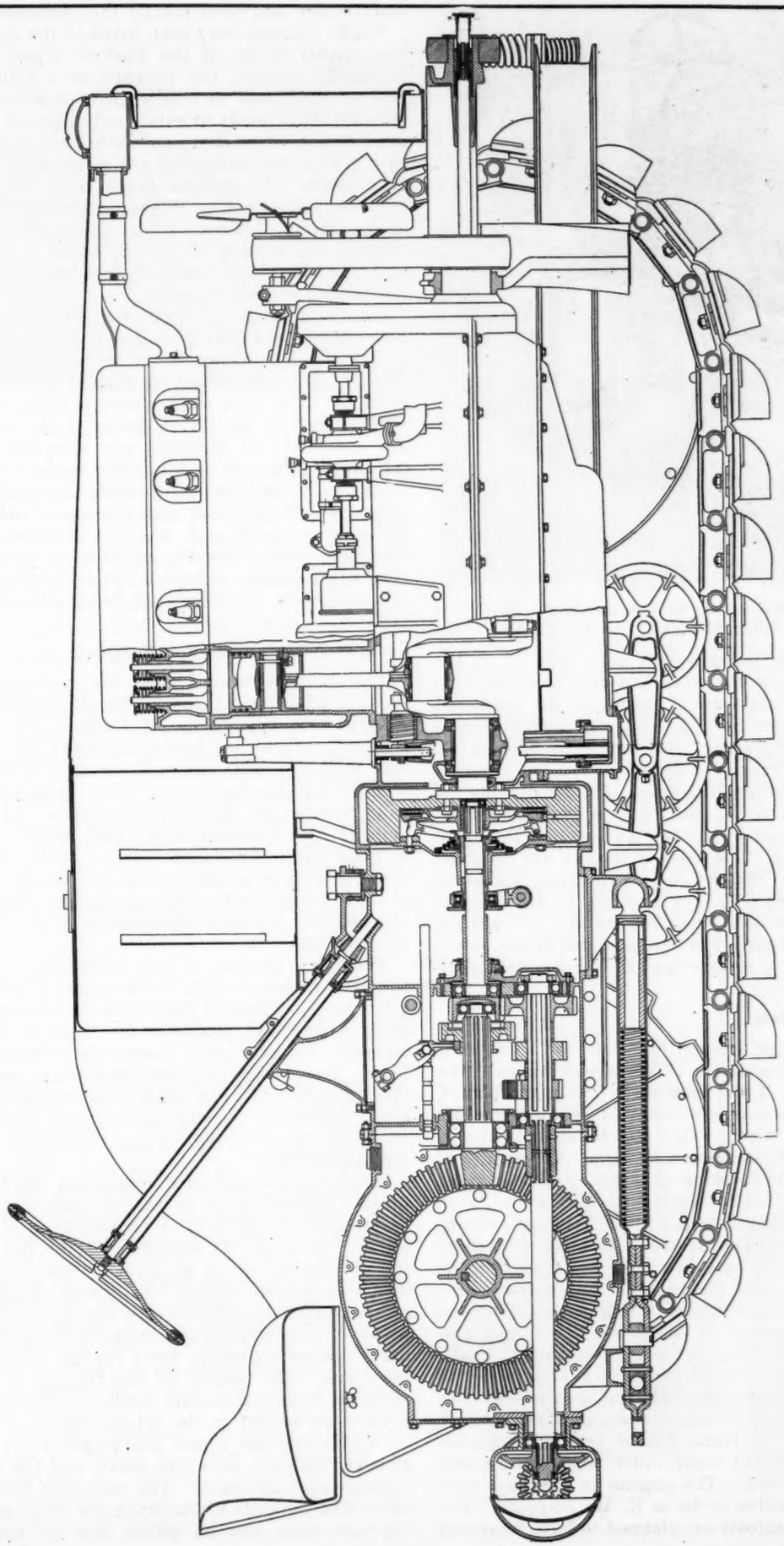
Directly above the rear axle is located the transmission case which is really a reversing gear case, as only one forward speed and one reverse are provided. Where the conditions of the work make frequent reversing necessary an extra pair of lines is provided for reversing in connection with the line drive. Otherwise the reversing gear is controlled by a lever on the transmission housing. The tractor is geared for a speed of 2.6 m.p.h. Changes in the gear speed can be easily made by interchanging the bevel gears in the transmission housing or in the high clearance model by changing sprocket pinions. The transmission case also encloses the gearing for the belt pulley on the right hand side. All bearings in the transmission are ball bearings.

The Cultor has a bar steel frame and is fitted with 36 x 5 in. rear wheels and 28 x 3 in. front wheels. The rear wheels are mounted on flexible roller bearings. Handy tool boxes are cast on the tubular extensions of the transmission case enclosing the sprocket shafts. While on the subject of tools it may be mentioned that the engine is so designed that two wrenches will fit all nuts and bolt heads.

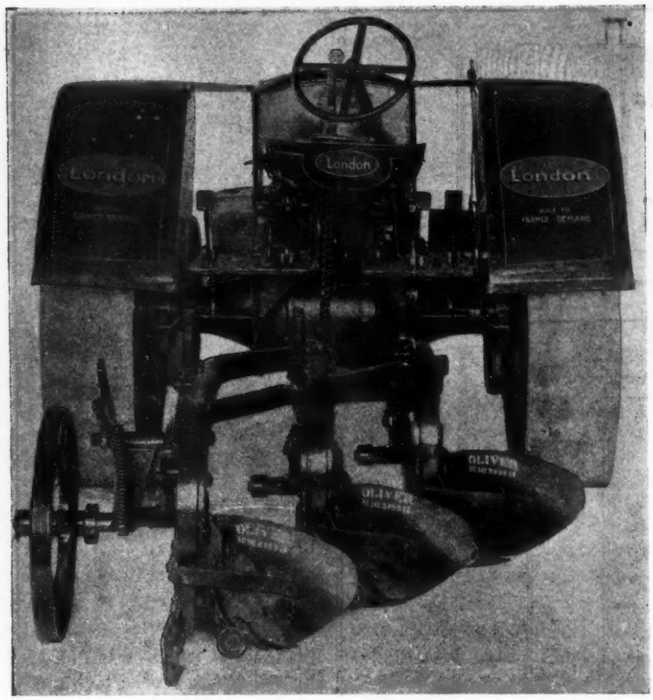
In addition to the uses already mentioned the Cultor is adapted for pulling disk harrows, mowing machines, a 6-ft. grain binder and a corn binder. Its clutch-controlled belt pulley makes it suitable for such lighter belt jobs as feed grinding, wood sawing, pumping and grain elevating. The manufacturers plan to furnish cultivator beams to attach directly to the tractor. It is claimed that the machine can be switched from one implement to another in less time than it takes to harness a team.

Improvements in Parrett Model M

A number of improvements have recently been made in the Parrett Model M which is fitted with a Midwest engine and rated at 16-28 hp. It is now equipped with a leather-lagged belt pulley which tends to prevent belt slippage. The radiator is now set cross-ways of the frame and is provided with a combination of shutters for controlling the cooling effect in winter. The fan is driven through spiral gears and a short belt from the pump shaft



Longitudinal center section of Bear creeper tractor



Rear view of London tractor, showing details of plow-lifting mechanism

of the engine, and the pump is now gear driven. In the cab there is a spring-supported wooden platform, the object of which is to take some of the jar off the operator's feet when driving over hard ground. A spring seat is provided which is adjustable fore and aft and also up and down to suit drivers of different size. The comfort of this seat is further increased by supporting it on the spring platform alluded to. A spacious sheet metal tool box is located in the cab platform on the opposite side from the seat. The sides of the cab are provided with inwardly turned flanges to provide the necessary stiffness, and these sharp flanges were apt to dig into the driver's sides when he leaned against the cab. To obviate this discomfort filler boards are now provided at the points in question, these being so arranged as to come flush with the edge of the flange.

Changes in Old Models

The Gray drum type tractor has now for some time been fitted with the new design of Waukesha engine. The cone clutch, which is of the company's own manufacture, has been redesigned and is now operated by a large volute spring without adjustment. This clutch can be removed from the tractor without disturbing either the engine or the transmission. The steering gear also has been redesigned with the object of increasing its life.

Various changes have been made in the Whitney tractor, a two-plow machine. The frame has been materially strengthened. The fuel tank has been removed from in front of the radiator and placed over the engine. This undoubtedly resulted in increased cooling capacity, but the radiator has been enlarged in addition. The fan is now driven by a short belt from the gear-driven pump shaft. On the former model the belt was very long and ran forward from the engine crankshaft and then passed over an idler pulley on which it turned through a right angle to pass crosswise of the frame to the fan pulley at the center. Forged gears and taper roller bearings are now used in the transmission. The engine is provided with larger valves and ignition is by a K. W. magneto. Improvements in the manifolds are claimed to have improved distribution and consequently the combustion of kerosene.

Slight changes have been made in the All Work Second, the smaller model of the Electric Wheel Co. This was originally brought out in 1919 as a California orchard tractor. An oval throttle disk is now used, so that the throttle shaft needs to rotate only through an angle of 60 deg., instead of 90 deg. as required with a circular throttle disk. This has permitted a simplification of the throttle connections. On the All Work model the engine output has been increased by enlarging the valves and changing their timing. Economy in oil consumption has been effected by drilling oil return holes in the piston skirt and changing the oil level so that the connecting rods do not dip so deep as formerly.

On the Rumely Oil Pull tractors a sheet iron shield now encloses the final drive gears, so that the transmission is completely enclosed from the crankshaft to the rear wheels. The reatomizer bushing in the carbureter, which is in the form of a second venturi tube, is now provided with a shelf or an inside flange at its lower end, which has the effect of throwing any kerosene condensing on the carbureter walls back into the center of the air stream. Both the fuel and the water nozzle in the carbureter, which formerly were provided with a series of round spray holes, are now provided with a single straight saw slot each, The new Bosch impulse coupling is used, and as this eliminates danger of back kicks in starting, the magneto is arranged for fixed ignition, being set with about 35 deg. advance.

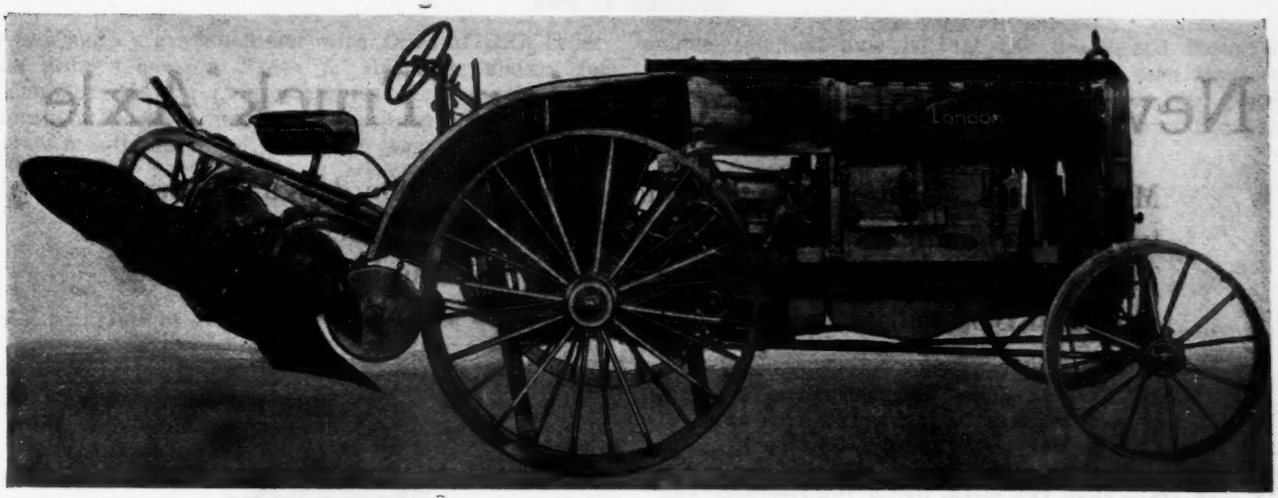
Creeper Attachments for Fordson

The Hatfield-Penfield Steel Co., which has taken over the manufacture of the Henneuse tractor described in AUTOMOTIVE INDUSTRIES of October 21, 1920, also exhibited a Fordson tractor equipped by it with "rigid rail tracks." It is claimed for this attachment that it doubles the drawbar pull of the tractor, eliminates slippage, lowers and narrows the tractor (of importance in orchard and vineyard work) and enables it to work on soft and sandy ground, as in rice fields. The increase in drawbar pull is no doubt obtained largely at the expense of speed, as the bottom diameter of the track driving wheel is materially less than the diameter of the regular Fordson rear wheels.

The track consists of cast steel links so designed that they will interlock when on the ground, forming a smooth, rigid track. There is said to be no movement of the pins while under load, whereby the wear of the pins is decreased. No provision is made for lubricating the track joints, the feature just described being claimed to render this unnecessary. The track links are made of manganese steel. Increased working capacity and decreased fuel consumption per acre plowed are claimed as advantages of the attachment.

Another attachment for converting the Fordson tractor into a creeper type or at least to impart to it some of the advantages of the creeper construction, is known as the Miller Tractread. It consists of seven flat surfaced links joined together so as to form a closed or endless chain which is wound around the tractor wheel. A ring in four segments is bolted to each side of the regular Fordson wheel. These rings are provided with equally spaced pins which insure a positive drive for the wheel as it rolls on the track. The weight of the tractor is carried by the rings as they roll on the inside of the track links, and there is no weight on the driving pins.

To convert the wheel, the flexible track is laid on the ground, the same as a tire chain, and the tractor is then backed onto the track. The pads are lifted around the wheel and the ends of the track are then joined by inserting two pins, one on either side of the wheel. The



London 3-plow tractor with plow

operation is claimed to require only 5 minutes and to be within the ability of any one who can drive a tractor.

Some tests with these tractreads on a Fordson were made at Purdue University and showed an increase in the average drawbar pull from 1400 to 1800 lbs., and of the maximum drawbar pull from 1800 to 2300 lbs., accompanied by a decrease in speed from 2.70 to 2.09 m.p.h. and a decrease in slippage from 13.9 to 0.05 per cent.

London Tractor With Power Lift for Plow

The London Motor Plow Co. exhibited a medium size tractor rated as capable of pulling three 12-in. plows. It is an assembled job, comprising a Midwest four-cylinder 4⅛ x 5¼ in. engine, its original feature being that the plow is in a way a part of the tractor and is raised and lowered by power. One advantage of this is that when the plow is lifted it is suspended from the tractor and has then no influence on the turning ability of the outfit, making it possible to turn in a much smaller circle and thus to get better into the corners of fields.

Other components besides the engine include a Columbia 1¼-in. carbureter, a Siphon air washer, Taco governor, K. W. magneto with impulse starter, S. & J. radiator, Hy-Duty fan and Detlaff dry disk clutch. The transmission, which is of the sliding pinion type, gives two forward speeds of 2.7 and 4.1 m.p.h., the latter being intended for road work. The final drive is by enclosed spur gears at the center of the live rear axle. Ball and flexible roller bearings are used in the transmission and axle. From the rear axle shafts the power is transmitted to the rims of the rear wheels through spring arms which relieve shock and jar.

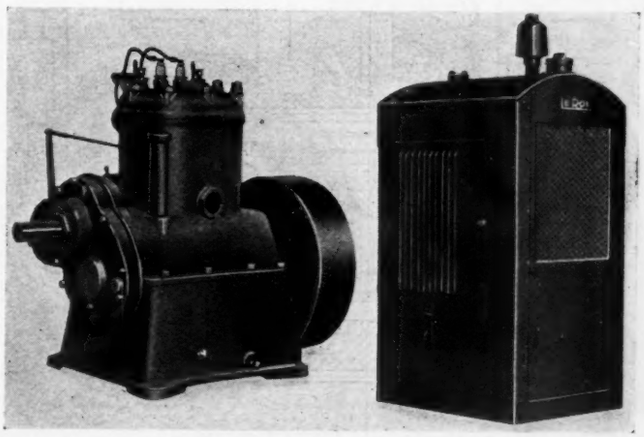
The belt pulley, which is 14 in. in diameter by 8 in. in width, is mounted on the left hand side, 6½ in. above the crankshaft axis, so that the belt will clear the front axle by about 7 in. The pulley speed is 1000 r.p.m. The belt power unit is fitted with flexible roller bearings and is lubricated by splash. There are three pedals on the driver's platform, for the clutch, brake and power lift respectively. The plow is so designed that by the removal of five bolts the third beam can be taken off, thus making it a two-bottom plow for use in extra heavy soil.

Le Roi Stationary Engine

A TWO-CYLINDER engine for general power purposes has been brought out by the Le Roi Company. It has the same cylinder dimensions as the Le Roi four-cylinder engine, which is widely used for motor cultivators and light tractors—namely, 3⅛-in. bore by 4½-in. stroke, and 87 per cent of the parts in the new engine are interchangeable with parts in the four-cylinder. This not only makes for economy in manufacture but simplifies the service problem, as 56 manufacturers in different parts of the country use the Le Roi four-cylinder engine.

A novel feature of the engine resides in the fact that the drive may be taken off at three different points, viz., at either the forward or rear end of the crankshaft or at the camshaft, at one-half crankshaft speed. The camshaft is mounted on ball bearings and is driven through machine cut gears.

The engine is furnished complete with all accessories, including fuel tank, radiator, fan and fan belt. It is fully inclosed and may be run on equipment without the necessity of building a house over it. Equipped and inclosed in this manner it weighs 325 lb. It may also be purchased without accessories and other equipment, and then weighs only 260 lb.

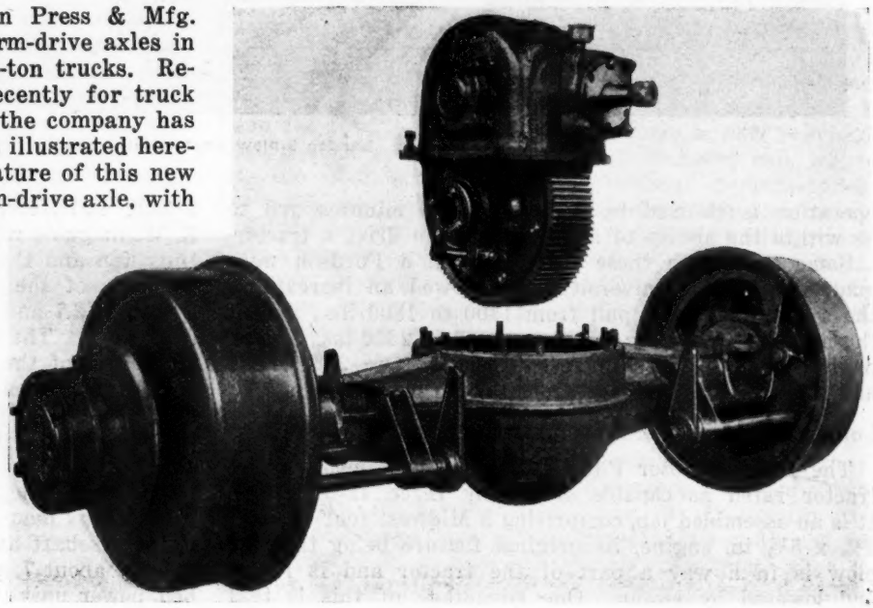


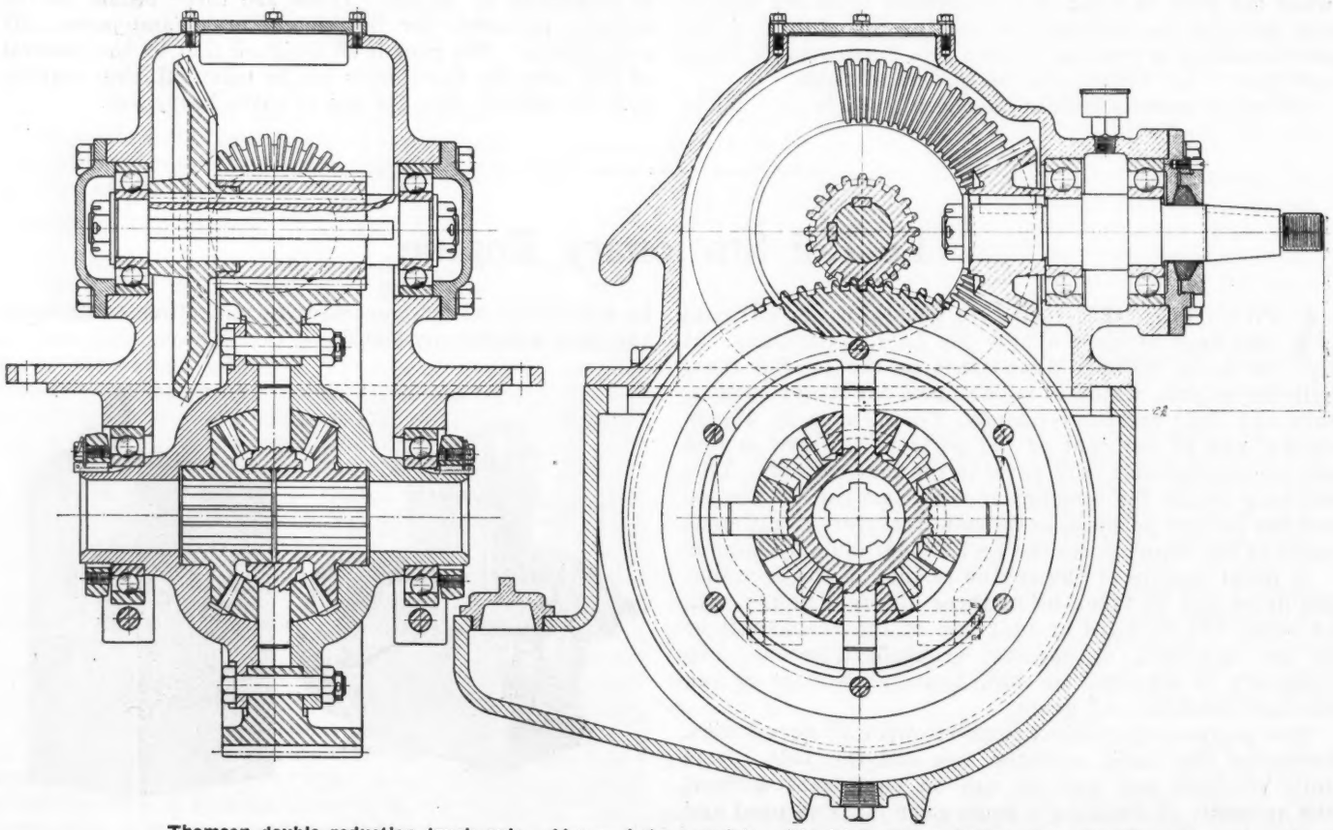
Le Roi stationary engine and cover

New Double Reduction Truck Axle

Manufacturer of worm drive axle adds double reduction design, the two types being identical except for the driving gears in the central housing. The two types of gear carries interchange on the same housing. Double reduction type said to be more efficient than the worm.

HERETOFORE the John Thomson Press & Mfg. Co. has been manufacturing worm-drive axles in sizes suitable for 1-, 2- and 3½-ton trucks. Realizing the demand that has arisen recently for truck axles with other than the worm drive, the company has brought out a double-reduction axle, as illustrated herewith. Perhaps the most interesting feature of this new axle is that it is identical with the worm-drive axle, with the exception of the parts supported by the gear carrier. As shown by the photograph, the housing of cast steel has an opening in the top to which the gear carrier is fitted which carries the differential, worm and worm wheel in the case of the worm-drive axle, and the differential, spur and bevel gearsets in the case of the double-reduction axle. The center distance between axle and driving shaft is the same in both cases. This enables the company to offer customers a choice of either the worm drive or the double-reduction drive; in fact,





Thomson double reduction truck axle. Above—Axle complete with driving gear lifted out of housing. Below—Transverse and longitudinal section through gear housing

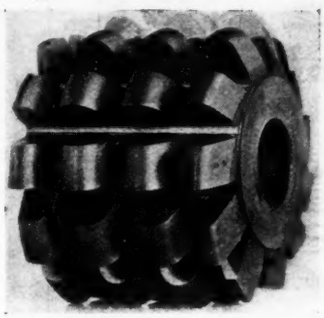
they can supply any customer with axles of both types.

The John Thomson Press & Mfg. Co. claims for the double-reduction axle a higher efficiency than can be obtained from the worm-drive axle in regular operation. An advantage of no mean importance of the double-reduction axle is that the heavy end thrust of the worm drive is eliminated. It will be seen from the illustration that the spur gear of the drive has a very wide face, which should result in long life of the gear as well as quieter operation.

Universal Hobs for Sprocket Teeth

THE principle of generating the teeth of interchange-involute gears from a rack with straight sided teeth is well known, and the application of this principle to the hobbing of such teeth is also well known and well established. Sprocket teeth, however, are still cut almost entirely by the ordinary rotary cutter, the reason being that up to the present time it has been generally supposed that only a limited range of teeth could be correctly cut by a single hob, and that a large number of expensive hobs would be required to properly equip one's shop for sprocket cutting by this means.

The engineering department of the Diamond Chain & Mfg. Co. has worked on this problem for the past year and has succeeded in developing a set of hobs, each of which is capable of cutting all sprocket wheels of a given pitch and roller diameter, irrespective of the number of teeth. This will effect a considerable saving in cutter equipment wherever hobbing machines are in use, since a single hob will do the work that has hitherto required a set of from six to nine cutters. Further advantages result from the greater rapidity with which sprocket can be cut out on a hobbing machine, and the accurate indexing which is characteristic of such machines.



New design hob

These hobs are designed to cut sprocket teeth in conformity with the new "American Standard" tooth form, which has been described in AUTOMOTIVE INDUSTRIES. This tooth form lends itself peculiarly to the hobbing method of cutting, since it neither requires a constant "space angle," as in the British system, nor a constant tooth angle as in some systems in use in this country. Its space angle gradually decreases as the number of teeth increases, and its tooth angle (and hence its pressure angle) gradually increases. The generating action of a hob tends to produce these same changes, although not at the same rate.

The problem of hobbing sprocket teeth differs from that for gear teeth in several respects:

(a) With spur gears the circular pitch is constant for all numbers of teeth. With sprockets the circular pitch decreases as the number of teeth increases.

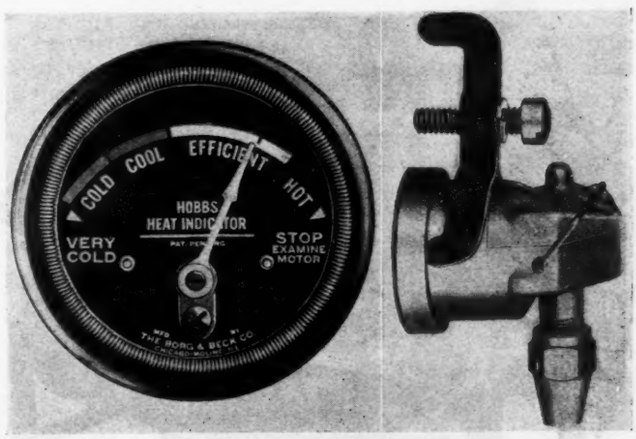
(b) With spur gears the curvature of the teeth becomes sharper as we approach the base circle. With sprockets, it is desirable to increase the radius of curvature as we approach the lower, or acting part of the tooth, and finally to change the curve from convex to concave.

(c) With spur gears, the pitch of the hob is always equal to the circular pitch of the wheel. With sprockets the pitch of the hob is greater than the circular pitch of the sprocket for all over a certain number of teeth, and is less than the circular pitch of the sprocket for all under that number. The imaginary circle which rolls upon the theoretical pitch line of the rack is sometimes larger and sometimes smaller than the pitch circle of the sprocket.

A Theft Proof Heat Indicator

A TEMPERATURE indicator which is mounted on the dash and shows the temperature of the cooling water in the engine jacket is being marketed by the Borg & Beck Co. It consists of three main parts—the main actuating unit, which clamps to the engine cylinder, a flexible shaft and a gage. The actuating unit contains a small, sensitive thermostat, which expands and contracts in direct proportion to temperature changes. Through a gear sector and pinion this thermostat rotates a flexible shaft of the dental type which connects directly to the pointer of the gage.

On the scale of the gage the temperature ranges are indicated by contrasting colors. Thus the operator is enabled to observe the heat condition of his engine at a glance. Among the advantages claimed for this indicator are that it indicates the temperature of the water in the engine jacket rather than in the radiator, that the instrument is adjusted to each individual engine, that it is not exposed to the weather, that the gage is close to the driver and can be easily read by day and night, that by reason of its location it is theft-proof and not liable to breakage and that the instrument is simple and durable. The heat indicator is applicable to the engines of all classes of automotive apparatus and its adaptability to farm tractors is particularly stressed by the makers.



The dash dial and actuating unit of the Hobbs Heat Indicator

British Maker Adopts New Slide Valve Engine

Has split sleeve 4 inches long, weighing 8 ounces. Located in cylinder head and operates at one-fourth engine speed. Design embodies many unorthodox features. Uniform cooling is a feature. Apart from the valve system the engine has unconventional features which are described here.

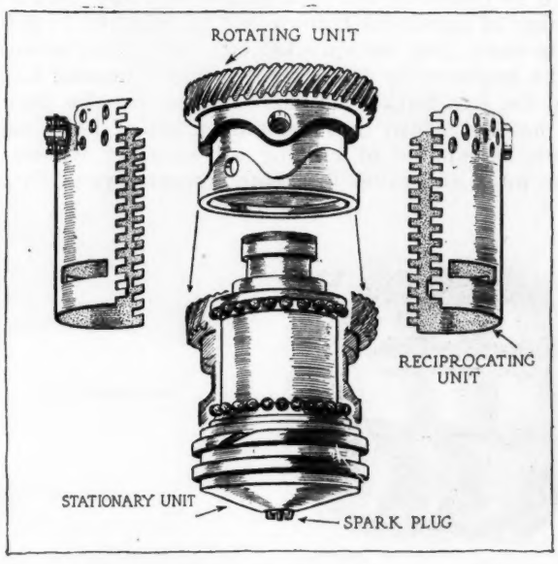
By M. W. Bourdon

AT the Olympia Show there was exhibited a new 20-hp. Vulcan chassis having the Howard slide valve engine. The design of the latter embodies many unorthodox features, so many, in fact, that surprise has been expressed that an otherwise so conservative concern as the Vulcan should have entertained the idea of making experimental engines with a view to testing out the system.

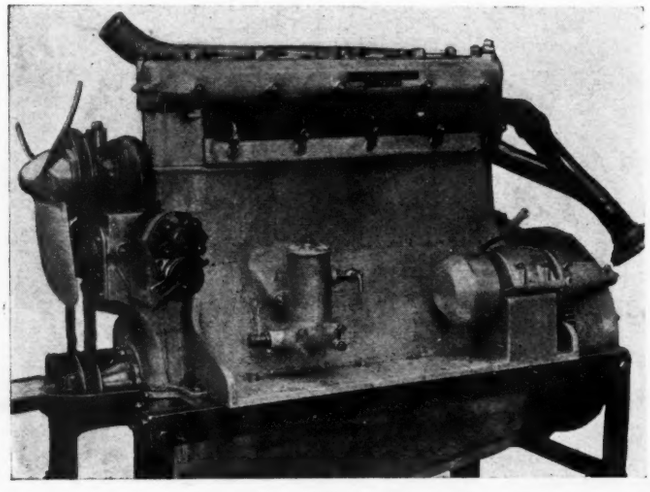
The Howard valve is approximately 4 in. long and is located above the top end of the piston stroke. Referring to the accompanying sketch, the two units forming the valve consist of a light steel open-ended cylinder split vertically and tongued together by square teeth. When the halves are brought together they form an extensible tube capable of expanding in two directions at right angles to its axis. Obviously the halves must be made as separate castings and the first machining operation is the forming of the teeth; next the latter are meshed, the halves are soldered together and they are not separated again until all machining and grinding operations have been completed.

Valve Has Reciprocating Motion

The sleeve thus formed weighs 8 oz., is 3/32 in. thick and has ports cut near its lower end, two in each half, 9/32 in. deep and extending all round the whole unit excepting for the ½-in. wide lands between them. The valve has a purely reciprocating motion attained as follows: Driven from the front end of the crankshaft by skew gearing is a vertical shaft rotating a horizontal valve-operating shaft running along the top of the cylinders on the left. This valve shaft has four worm gears each engaging with its fellow riveted to a rotating unit in which is cut a cam groove providing two cycles of valve operation, the gears therefore having a ratio of 4 to 1. The cam sleeve rotates on ball bearings, with races at top and bottom of a fixed head plug, the plug being water-cooled with internal webs supplemented by baffles in the cylinder head jacket to ensure circulation through what would otherwise be a dead end.



Details of Howard sliding valve and operating mechanism.

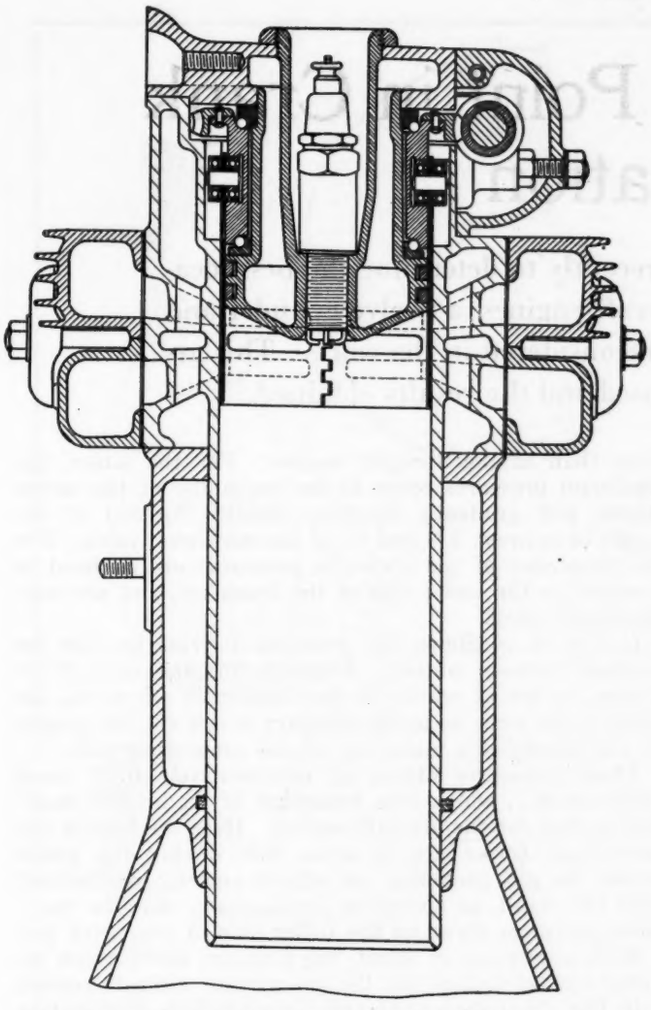


Howard sliding valve engine.

Valve Actuation

On each half-valve are two small ball bearings, one inside and the other outside; the inner one engages with the rotating cam groove, the outer one moving vertically in a short groove formed in the cylinder extension and preventing the valve as a whole from rotating. Around the walls of the combustion space are two rows of four ports corresponding with the single row on the valve, the upper row forming the exhaust outlets into a manifold at each side, while the bottom row are inlet ports also coupled to two manifolds with internally cored passages in the cylinder jackets uniting them and leading to a single carbureter on the right.

The total travel of the valve is ⅝ in., the land between the cylinder ports being 11/32 in. wide, thus allowing of a slight overlap of the 9/32 in. sleeve slots on



Vertical section through cylinder and head of Howard engine.

the compression and firing strokes, when the valve is central and stationary. When the valve ports commence to open on the completion of the firing stroke, there is a residual pressure in the cylinder of approximately 50 lb. per sq. in., and this pressure has effect, it is claimed, in raising the valve for the opening of the exhaust ports without assistance from the cam groove, a claim based upon the fact that the corresponding part of the groove has shown no sign of wear after lengthy use.

Lubrication of the valves and their driving gears is maintained by a lead from the main pressure system to the overhead drive shaft bearings; some of the excess oil exuding from the latter serves for valve, etc., the remainder being returned to the crankcase. The head plug has the usual junk rings to prevent leakage of mixture outward. Piston travel and valve movement overlap slightly at different periods, so assisting in the lubrication of the lower end of the valve by a transfer of oil; but direct overhead lubrication is really depended upon.

Engine Is Unconventional

Apart from its valve system, though necessarily to be considered in conjunction with it, the engine is more or less unconventional in construction. The cylinder water jackets and the upper half of the crankcase are cast as a unit in aluminum, the actual cylinders—a cast iron block—being entered from above with a gasket at the head joint and a rubber ring joint at the base of each water jacket; thus the cylinder barrels have contact with the water.

The Vulcan chassis to which this valve system is applied has four 3½ x 5⅛-in. cylinders. Apart from silence in operation and the other features of merit (absence of valve grinding, springs, etc.) usually associated with sleeve valves, high efficiency is claimed for this design, and far higher piston speeds than are usual with long sleeves. Uniform cooling is said to be a feature, and to permit of compression ratios up to 5 and 5½ to 1 and an m.e.p. up to 114 lb. per sq. in. without detracting from such characteristics as tractability and smoothness in operation under normal driving conditions. As a result a fuel consumption of 0.47 lb. per b.h.p.-hour is claimed, and a power curve running as a straight line from 32 b.h.p. at 1000 r.p.m. to 82 at 3200, with a safe maximum speed of 4500 r.p.m.

The valve timing is as follows:

Inlet opens 15 deg. late; closes 30 deg. late.
Exhaust opens 30 deg. early; closes at top dead center.

This timing, it will be seen, provides a period represented by 15 deg. of flywheel rotation between the closing of the exhaust and the opening of the inlet. The total port area of the inlet as well as the exhaust is approximately 2.7 sq. in.

Oil Pump Operated by Chassis Vibration

A RATHER peculiar form of servo motor has been patented in France by J. B. Barbarou. Referring to the illustration, two sector-shaped weights, which are pivoted on a common axis, are connected together by two coiled springs and also by a balance lever and two connecting links, which compels them to move in unison. Formed integral with the central shaft is a ratchet wheel with which two pawls are adapted to engage. These pawls are pivoted to the two weights respectively and are pressed against the ratchet by small springs.

If the case of this device is secured to a vertically oscillating body, such as the frame of an automobile, the inertia of the weights prevents them from following when the frame drops. The result is that the lower edges of the weights separate, and the motion of the weight on the left through its pawl causes the ratchet wheel to move ahead one or two notches. On the reverse movement, when the spring distends, the other pawl, connected to the right-hand weight, functions in the same way. Thus the ratchet wheel receives an intermittent motion, always in the same direction, from the oscillating weights. If some device which does not have to be operated permanently is keyed to the shaft, such as an oil pump, it will be operated by the oscillations of the chassis.

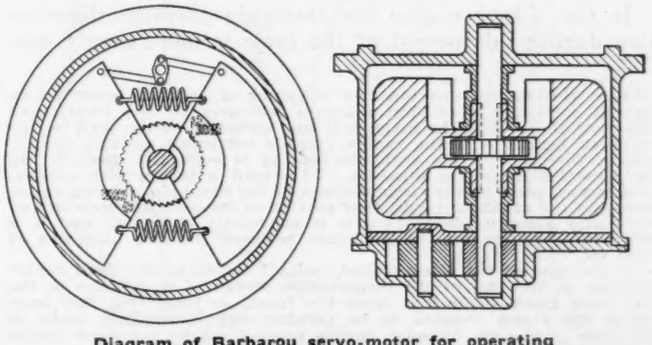


Diagram of Barbarou servo-motor for operating oil pump

An Analysis of a Point in Crank Lubrication

An analytical investigation was made recently to determine the best location for crank pin oil holes. Four aircraft engines, a twelve cylinder and a six cylinder passenger car engine were considered in the work. This article describes in detail the methods used and the results obtained.

AN exhaustive study of the subject of crank lubrication has been made recently by the Engineering Department of the Packard Motor Car Co. By means of an analytical method the best location for the crank pin oil holes was determined. This method was applied to two Packard and two other aircraft engine types and to the Packard twin six and single six automobile engines.

The connecting-rod bearing is subject to the action of three important forces. These are the gas pressure on the piston, which is transmitted through the connecting-rod; the inertia forces which arise from the acceleration or change in velocity of the reciprocating parts, and the centrifugal forces due to the rotation of the large ends of the connecting-rod.

To transmit these forces to the crankshaft properly the connecting rods must be designed to maintain the proper form, operate with minimum friction and have maximum wearing qualities. The method of determining the best oil hole location consists in studying the pressure distribution on the crank pin. Bearing loads are determined for 24 evenly spaced crank positions covering a whole cycle or two crank revolutions. Diagrammatic representation of these loads for various engines are given in Figs. 1, 3, 5, 7 and 9. The pressure distribution on the crank pin is indicated by Figs. 2, 4, 6, 8 and 10. These diagrams are polar diagrams, and the radii from the center points indicate both the direction and magnitude of the pressure on the crank pin.*

The study of six different engines operating under various conditions of speed gives a very clear idea of the nature of crank-pin pressures.

Figs. 2, 4 and 6 show the results obtained for four different aircraft engines. The first two figures mentioned refer to V-type engines and the latter to ordinary designs in which there is only one connecting rod to a crank pin. In these engines the gas pressures are the dominant forces; consequently, the highest pressures on the crank pin occur during the power stroke, and on the trailing side of the crank pin.

In the V-type engine the crank-pin pressure distribution during this period of the cycle is more nearly uniform than in the straight engine. For the latter, the maximum pressures occur at the beginning of the power stroke, and gradually diminish toward the end of the stroke to between 1/3 and ¼ of the maximum value. For the remainder of the cycle the pressures are confined to a region on the under side of the crank pin, and are comparatively small.

In Fig. 8 is shown the pressure distribution for the Packard twin-six engine. Although this engine is of the V-type, so far as crank-pin distribution is concerned, the effect is the same as in the ordinary single six, on account of the side-by-side mounting of the connecting rods.

These pressures obtain at comparatively high speed (2750 r.p.m.), which give somewhat of an inverse condition to that for the aircraft motors. Here the inertia and centrifugal forces are so great that during the power stroke the gas pressures are almost entirely neutralized, with the result, as shown in the diagram, that the maximum pressures occur on the under side of the crank pin.

With a decrease in speed, the pressure distribution becomes similar to that for the six-cylinder aircraft engine.

In Fig. 10 is shown the crank-pin pressure distribution for the Packard single-six engine when running at a speed of 2400 r.p.m. In this case the proportion of gas pressures to inertia and centrifugal forces is somewhat greater than for the twin-six, and, consequently, a more uniform pressure diagram obtains during the power stroke.

It will be noted that in every case there is a region on the crank pin which is not loaded during any part of the cycle. The extent of this unloaded portion varies somewhat with the different engines, but its position on the crank-pin surface is always substantially the same.

Theoretically, placing of the oil hole anywhere in this region should give the results sought. In the aircraft engine it has been observed that the maximum pressures occur during the power stroke, and inasmuch as the direction of load changes at the point of explosion, the point of contact between the connecting rod and its bearing is then transferred from the under side of the crank pin to the upper side.

During this change, the clearance in the bearing is naturally transferred to the opposite side, which results in a trapping of the oil present between the surfaces where the clearance becomes a minimum. It is, therefore, essential that the oil hole should be so located that a plentiful supply is present in the bearing just previous to explosion. This location for aircraft engines of the V-type is probably in the neighborhood of that shown in Figs. 2 and 3, which is 45 deg. from the vertical. For the six-cylinder aircraft type 30 deg. from the vertical is probably a more suitable location. Passenger-car engines operate under somewhat different conditions from aircraft engines, and for such engines 45 deg. from the vertical is probably the most suitable position for the oil hole.

*The relation between the two diagrams of each set may not be directly apparent. The first diagram indicates by the length and direction of its radii the magnitude and direction of the load on the crankpin bearing. If the radius extends vertically upward, for instance, the load on the crankpin bearing is vertically upward. In the second diagram the direction of the load is shown with relation to a certain point on the circumference of the crankpin. Owing to the fact that the crankpin turns, that portion of its circumference in any particular direction from its axis is constantly changing, and it is this that accounts for the difference between the two diagrams of each set.

In the case of the Vee engines, point 1 indicates the dead center position at the end of the compression stroke of a cylinder in the left hand block (looked at from the front, or from that end from which the crank appears to be turning right-handedly), while in the case of the six cylinder engine point 1 marks the dead center position at the end of the compression stroke.—Editor.

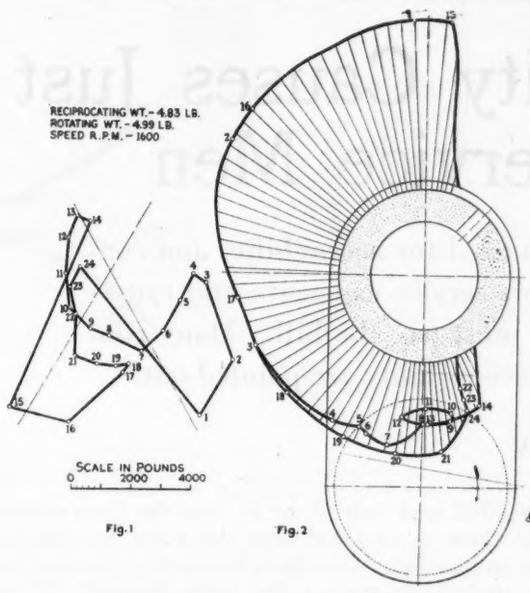


Fig. 1

Fig. 2

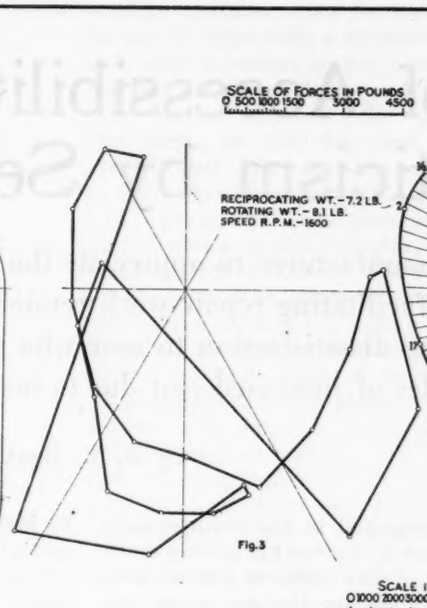


Fig. 3

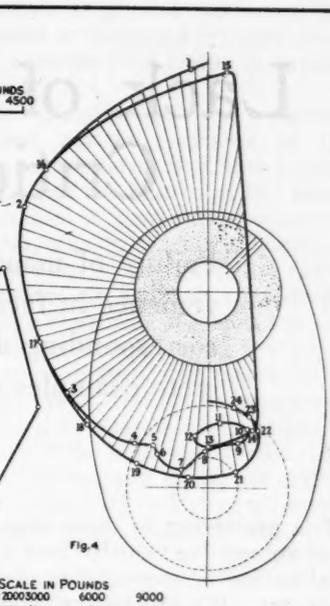


Fig. 4

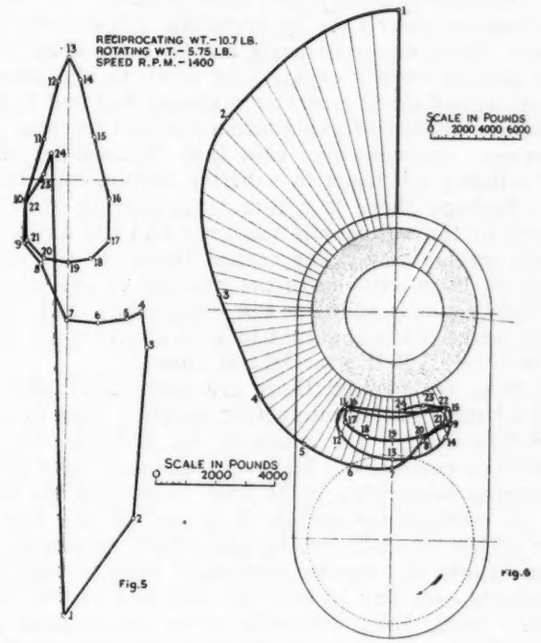


Fig. 5

Fig. 6

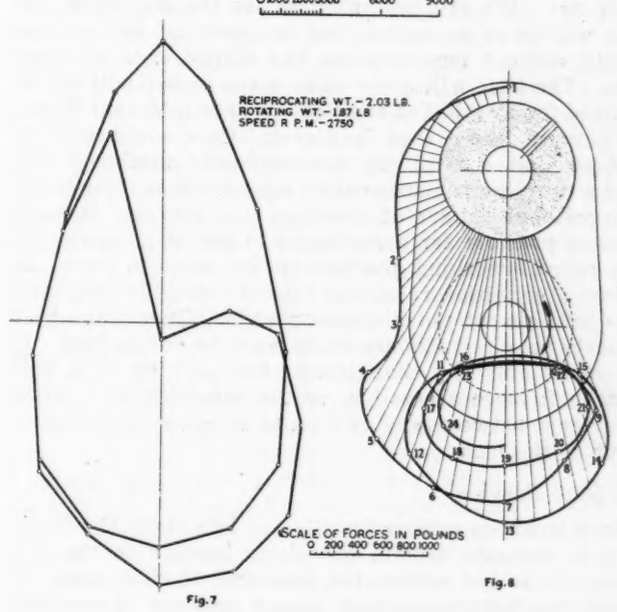


Fig. 7

Fig. 8

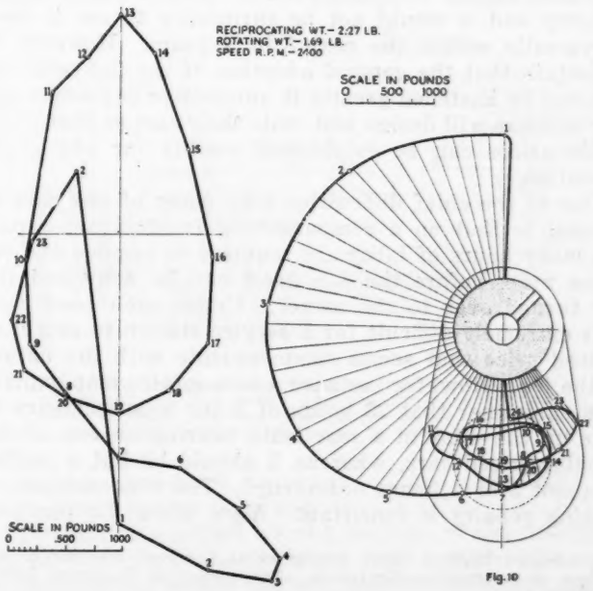


Fig. 9

Fig. 10

Fig. 1—Total combined loads due to all forces acting on Crank pin—Packard 1A-744 and 1A-116 Aircraft Engines.

Fig. 2—Distribution of pressure on Crank pin—Packard 1A-744 and 1A-1116 Aircraft Engines.

Fig. 3—Total combined loads due to all forces acting on Crank pin—Packard 1A-2025 Aircraft engine.

Fig. 4—Distribution of pressure on Crank pin—Packard 1A-2025 Aircraft engine.

Fig. 5—Total combined loads due to all forces acting on Crank pin—Packard 1A-1551 Aircraft Engine.

Fig. 7—Total combined loads due to all forces acting on Crank pin—Packard 325 car engine.

Fig. 8—Distribution of pressure on Crank pin—Packard 325 car engine.

Fig. 9—Total combined loads lue to all forces acting on Crank pin—Packard 116 car engine.

Fig. 10—Distribution of pressure on Crank pin—Packard 116 car engine.

Lack of Accessibility Causes Just Criticism by Service Men

Failure of manufacturer to appreciate the need for accessibility and convenience in facilitating repair work renders service expensive and causes corresponding dissatisfaction to user who must pay the bill. Many concrete examples of increased cost due to inaccessibility are pointed out.

By B. M. Ikert*

IT is gratifying to those engaged in the maintenance of automotive vehicles that designers are giving more attention to accessibility of the units in the modern motor car. We are beginning to see the day when car parts will be so accessible that one unit can be removed readily without necessitating the disturbance of other units. The time will come when a car owner will not be required to pay a bill of some $35 to have a 10-cent Woodruff key put into a shaft and gear. Cars now are being built so that a relatively inexperienced mechanic can make a coupling replacement on a magneto or distributor drive without danger of upsetting the timing. It must be made possible for a mechanic to get at a repair job in a normal working position in the cars to come, as against a condition requiring him to twist his body and arms into almost unbelievable shapes. Operations that formerly required 4 hours to do must be cut in half. It may mean only the changing of the position of a bolt to make it more accessible, or the provision of a little more room between any two units to allow a mechanic to get at the parts.

Flat Rate Service

Much has been said and written of late about the fixed-price or flat-rate system of selling service to the car owner. It is not within the province of this paper to discuss the flat-rate system, except perhaps to mention that it is rapidly getting a good foothold throughout the country and it would not be surprising to see it used universally within the next 3 or 4 years. However, it is certain that the general adoption of the flat-rate system can be hastened greatly if automotive engineers and car builders will design and build their cars so that justifiable prices can be established readily for any given operation.

One of the chief difficulties with many of our cars at present is that on a comparatively insignificant repair job many hours of labor are required to remove and replace units before the job itself can be done and the car turned over to the owner. Under such conditions it is extremely difficult for a service station to establish a fixed price that seems commensurate with the nature of the job. How, for instance, can a service man explain to a car owner that 23 hours of labor was necessary to take up the wear in a rear main bearing on one of the popular-priced cars, whereas it should be but a matter of about 3 or 4 hours ordinarily? The time element in making repairs is important. Very often the parts to be installed cost only $1 or $2, but the time required to install them is so great that the price for the work is out of proportion. One finds frequently that car makers could materially reduce the time element for service operations on their cars by spending a few cents more per car. Interference of parts has been the chief obstacle in getting certain repair jobs down to a reasonable time basis, and many a service manager has had to make an endless amount of explanation for this to some irate car owner. Someone has said that "knowledge of the other fellow's job leads to a better mutual understanding." Perhaps there is a direct application of this in the case of the automobile engineer and the automobile dealer's service man. The easiest thing for the service man to do is to antagonize the product of the engineer and, likewise, it is easy for the engineer to criticize the service man for his apparent lack of ability to do repair work properly. Both are right at times.

All of us realize that there are many intelligent service mechanics in the automotive business, men to whom automobile dealers are indebted for holding the good will of their customers. Many of these men have enough engineering knowledge to be able to analyze the faults in a car intelligently and do it in such a way that the owner of the car will not be completely disgusted over having bought it. Service mechanics have to tear down and rebuild cars day in and day out, and in the course of their work they naturally come in contact with certain things in the construction of cars that are troublesome. A mechanic of great experience said a short while ago that the best thing the factories ever had done for the dealers' service departments was to make good liars out of the men employed therein. Perhaps this man overstepped the mark somewhat; his point was that the mechanics, while they realized well enough the faulty construction or inaccessibility of certain units, would not and could not tell the car owner about them for fear of putting future sales in jeopardy.

Accessibility

It is impossible in a paper of this kind to consider the entire structure of a motor car and attempt to cite good and bad points of design as they affect accessibility in repair work. It is realized fully that to change existing constructions on some cars would mean almost a complete retooling of the factory; the installation of new jigs, fixtures, dies and the like. Therefore, any criticism in the following paragraphs which may be directed at engines or cars is offered with this point in view. The major thought is to indicate the things of which service station mechanics complain most frequently, when they

*Condensed from a paper presented at a recent meeting of the Society of Automotive Engineers. The author is Technical Editor of *Motor Age*.

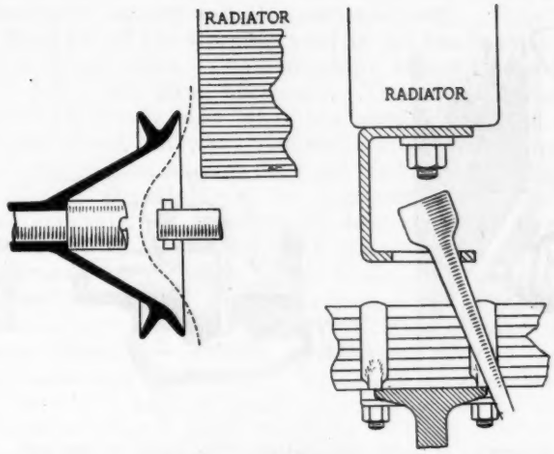


Fig. 1—Two difficulties frequently encountered in making repairs on the front end of a car

have to tear down or reassemble any of the units. It is likely that we shall never have 100 per cent accessibility in our cars. A motor car is made up of just so many necessary units and, if we make some certain one accessible, this probably will have been done at the expense of the accessibility of some other. Also certain units may seem accessible at the time of assembling the chassis in the factory, but when body and fenders are added the reverse is true. It is this condition with which the service station has to deal. Recently I looked at an engine that was very accessible out of the car and when in an engine-stand, but when in the car the engine was hung so low and had so many accessories heaped around it, such a multitude of wires, control rods, carbureter hot-air pipes and the like to obstruct the movements of the mechanic that all the efforts of the engine designer to secure accessibility were nullified.

Some 25 items peculiar to a considerable number of American cars are touched upon in the following paragraphs. These were chosen at random and exist in varying degree on other makes of car. Some of the things discussed cannot be classed under the general head of either accessibility or inaccessibility, and yet they are problems with which the service mechanic must come into contact more or less every day.

Aging of Castings

Opinion has been prevalent among repair men, service mechanics and cylinder regrinders during the last year or so that cylinder block castings have not been allowed to age enough before machining them. The same is true of cylinder heads. Naturally, the result is a warping of these parts when the car is put into use. The chief offenders along this line seem to be the six-cylinder engines, wherein the blocks are fairly long and therefore apt to distort more than would be the case with a shorter block. Those who are called upon to do much cylinder work in service stations state that one of the chief difficulties with the small six-cylinder engine is the ineffective cooling of the cylinder walls at certain points. Cylinders are apt to become hotter and wear more due to distortion when a Siamese joint is used than when so cast that the water is in contact with the walls all the way around. This condition is made more aggravating in a green block, and a service station mechanic obviously has much difficulty in trying to solve such a problem when the car probably has not gone over 1000 miles. This, then, is a case in which the manufacturer must do his part, either by sufficient aging of the blocks or by heat treating them, which is costly. A service station mechanic may be ever so good a workman, but he can do little with a twisted or distorted cylinder block and, what is worse, he has a harder time trying to explain matters to the customer.

In some engines the pistons do not overrun the bores at the top and bottom positions of the stroke, and there is then a tendency for the pistons to wear shoulders in the top and the bottom of the bores. The wearing of these shoulders is accelerated when the piston cocks in the cylinder, due to warpage, misalignment and other causes. Some engine designers are fitting longer pistons to offset this and, in addition, they design the engine so that the piston over-runs the bore top and bottom. Further, it is claimed that bringing the piston below the bore offers a good chance for excess oil to be whipped off of the piston skirt. Naturally, the service mechanic is not in a position to change existing design conditions in an engine, but if the maker gives the right thought to cylinder blocks, pistons and rings, the service man is much better able to cope with so-called oil pumping engines, fouling of spark plugs and the like.

Bolts, Capscrews and Nuts

In tracing out some of the more flagrant cases of inaccessibility we find that thousands of dollars and hours of labor could be saved annually in the upkeep of cars if makers would locate bolts, capscrews and nuts so that mechanics could use speed wrenches on them more readily. A double end wrench generally will do better work than a monkey wrench, but the speed wrench that has a socket incorporated in it to fit over a nut or capscrew completely is best of all, not only in securing a good hold but in reducing the time required to remove or replace the part. The most common difficulty in this connection is that bolt heads or nuts are placed too close to fillets or to surfaces running at right angles to the top and the bottom of the nut. This means that a mechanic cannot get at the nut or bolt with a socket wrench and therefore must use something else. This is made especially difficult where nuts are exposed to mud and water, as they are on front axle spring-clips. A recent test on the removal of nuts, which had become more or less rusted to the clips, showed that it required almost 2 minutes to remove the nut with an open-end wrench. On another car, where the layout permitted the use of a socket wrench, the same size of nut was removed in less than one-half minute. There are other places on the chassis where nuts and bolts are placed

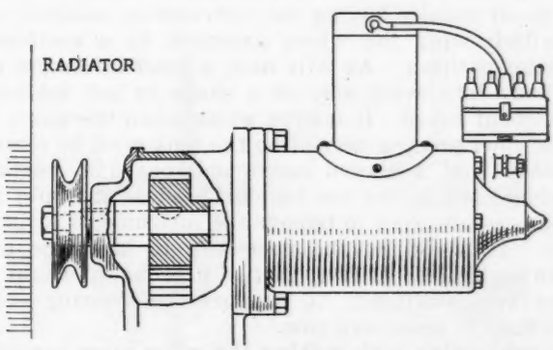
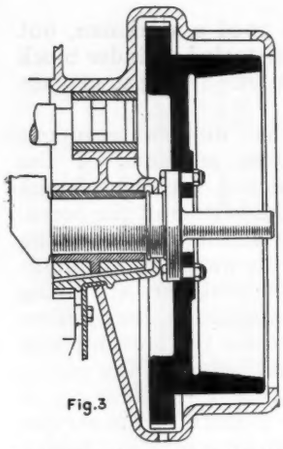


Fig. 2—In this particular case the radiator must be taken off, the fan pulley and the timing gear-case cover removed and the gear pulled before the generator and the shaft can be removed

in positions awkward to reach. Thus, cases are on record where spring bolts cannot be reached with either an open-end or a socket wrench because of the interference of mufflers, brake-operating rods and the like. In one instance the maker had not provided sufficient open-



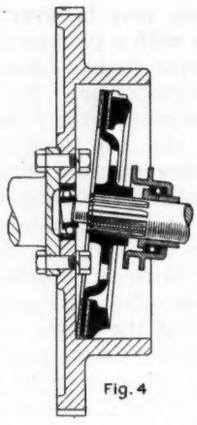
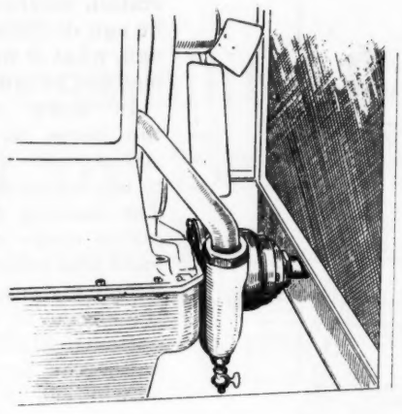


Fig. 3—Sectional elevation of a flywheel which cannot be removed until the crankcase is dropped, the connecting rods disconnected and the main bearing caps removed. Fig. 4—It is difficult to insert the clutch pilot shaft in this case because the bearing tilts in the flywheel



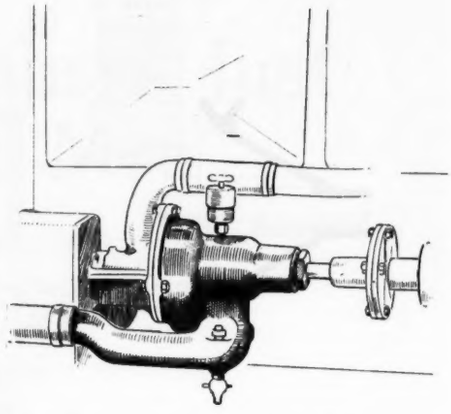


Fig. 5—Two examples of pump installation. The pump at the left placed on an extension of the crankshaft is difficult to get at when the gland requires repacking. The pump at the right is readily accessible

ing in the running-board splasher; so to remove the bolt in the front of the rear spring it was necessary to take off the running-board and splasher. The hole in the splasher was just large enough to permit lubrication; it would not allow the complete withdrawal of the bolt! How can a repair man explain to a customer that it is necessary to charge him for removing and replacing the running-board and splasher to install a new bolt?

One of the most frequent jobs in a service station is that of valve adjusting or grinding. Valves are accessible in general, except that the valves at the extreme ends of the set on some L-head engines are so close to the walls of the valve chamber that adjustment is difficult because the mechanic cannot give a good swing to the wrenches. Fitting a longer valve chamber cover would allow the wrenches to sweep over a wider range.

Dashboard Instruments

When the word "inaccessible" is mentioned to a service mechanic, among the first things he thinks of are the disposition of the instruments on the dash and the manner in which they are connected. It would cost but a few cents more per car to install somewhat longer wires on the switch, ammeter and fuse block, slightly longer copper tubing on the oil gage and longer choke wire; but this would mean a vast saving of time in the service station, because it would permit the mechanic to remove the panel usually having the instruments mounted upon it, withdrawing the whole assembly to a comfortable working position. As it is now, a mechanic must twist his body into every sort of a shape to get behind the instrument board. It is even worse when there is a tank in the cowl because very often the tank must be removed. It seems that a hinged instrument board is worthy of consideration by the car builder, because it would make it unnecessary even to remove the instruments to inspect them. It would not be necessary to have the entire board on hinges; in fact, part of it probably would need to be kept stationary to support the steering column as is done in most cars now.

In connection with making the wires more accessible, mention is made of the desirability of alloting definite colors to certain electric circuits, so that the same circuit can be identified readily on every make of car, once a man knows which circuits the colors indicate. As it is now, it is difficult for a mechanic to trace out a circuit when there are from 5 to 8 wires coming out of a piece of circular loom, all wires having the same color and appearance. Wiring diagrams are not always available and the problem often becomes acute in shops where all makes of car are worked upon. For instance, if a mechanic knew that all black wires designated the starting motor circuit; red wires, the ignition; green wires, the lamp circuits; yellow wires, the generator, ammeter and battery circuits, and blue wires the horn circuit, his problem would be lessened immeasurably. Many will recall that in former years one maker of an ignition system used red, yellow and green wires on the magneto and coil, and that the units were marked with the letters R, Y and G to show just where the connections were made. Some makers are using colored insulation on the wires for the various circuits, but no attempt has been made to standardize the colors for all cars.

General Take-up Adjustment

Much of the work in a service station is devoted to eliminating squeaks and rattles, some of which are difficult to locate at times. One car has a tube extending across the frame at the rear of the car. On the inside of this tube is a rod threaded at both ends so that the whole assembly can be tightened by drawing up on the nuts on the outside of the frame. The tube also supports the tire carrier. There is just enough play between the rod and the inside of the tube so that the rod vibrates at certain car speeds, strikes the walls of the tube and, because the tire carrier acts much like a sounding board, sets up a decidedly unpleasant rattle that is very difficult to locate. A slight kink given to the rod overcomes this.

Body squeaks are common, but frequently they can be overcome by tightening the body bolts. Here, however, difficulty sometimes is encountered in that the maker has used common carriage bolts sunk into the body sills. The nuts on these bolts often become rusted in place and, when the mechanic attempts to tighten or slacken the nut, the entire bolt turns and there is no way to get hold of the head of the bolt. Sometimes the bolt can be reached, but in such cases nothing is gained unless a square or hexagon head bolt is used. In most cases, also, the body bolts extend through the top flange of the frame only. This often makes the use of a socket wrench impossible, especially when units such as the muffler are placed alongside the frame at this point. Where a body bolt is extremely difficult to get at, a hole drilled in the bottom flange probably would allow quick access to the nut.

To overcome rattle in the brake operating shafts the shaft can be placed inside a sleeve, the shaft operating one set of brakes and the tube the other. A coiled spring

placed between the arm attached to the shaft and the tube takes up any end play automatically.

Removal of the steering gear is not the easiest job on most of our cars. The redeeming feature here is that this job is not often necessary. The job of removal becomes relatively easy when the gear is mounted on top of the frame, but when mounted between the frame and the engine, the engine does not permit the withdrawal of the gear housing and the drop-arm shaft. The latter can generally be removed by loosening the engine in the frame or dismantling the gear.

We have seen much better brake layouts within the last year or so, and much has been done to make adjustments easier. However, one criticism of brakes is that some makers are inclined to use stock for the contracting band that is too light. This does not hold its shape as well as a heavier band; often, when brake lining is riveted to such a band, the band will assume the shape of a polygon, caused by the hammer blows at each point of riveting. Obviously, such a brake band will not be as satisfactory as one which is bent to a true circle.

Inaccessible Parts Necessitating Dismantling

It is difficult for service men to understand why any maker should hide the vacuum tank in the cowl. Although vacuum tanks give very little trouble, there are times when they must be removed and there does not seem to be any good reason why the tank should not be mounted on the engine or at least on the engine side of the dashboard. The tank on one car is mounted in the latter position, but the bolts have been located so inaccessibly that it is virtually impossible to remove the tank. The plan of mounting the tank on the engine seems to be working out very well, inasmuch as the tank vibrates with the engine in this case and there is little danger of having the fuel lines crack off because of differences in vibration that often occur when the tank is located on the dash. Also there might be a more general use of coils in the copper tubing to prevent breakage due to vibration. Probably the greater proportion of service work is on engines. A few cases will be cited in this connection in which a little thought on the part of the engine designer will be of great benefit to the service station mechanic. The job of installing a fan belt very often runs into considerable cost because of the slight clearance allowed between the fan pulley and the radiator. Fig. 1 shows this situation as it exists on one of the popular cars. The dotted line shows the course which must be followed by the fan belt when installing it on the pulley. This car uses a heavy V belt and there is insufficient room between the radiator and pulley to allow it to pass. This means the loosening of the radiator, which mechanics are loath to do on this particular car because of the difficulty of getting the nuts back on the radiator studs. The illustration shows why. A hole is provided in the bottom flange of the cross member carrying the radiator, but a socket wrench cannot be used because the hole is in a direct line with the I-beam of the axle. Consequently, the wrench enters at an angle and cannot strike the nut. The remedy seems to lie in using a longer bolt extending through the bottom flange, with a spacer between the two flanges.

On still another make of car the radiator must be drained, the hood removed, the radiator stay rod disconnected, the hose connections broken and the radiator removed to take the generator off. This is necessary because the generator is mounted on the back of the timing gear case with its shaft extending through the case and has the fan pulley mounted on the other end, as shown in Fig. 2. The fan pulley must be pulled off and the generator drive gear removed before the generator can be slipped out of position. It appears that something in the nature of an Oldham coupling should be used between the generator and the drive gear, so that the generator could be slipped out of position without affecting the other units. The reason the radiator must come off is that there is not enough room between it and the end of the shaft to allow the fan pulley and the gear to be slipped off.

On one engine used in a number of light cars, the main and connecting rod bearing caps must be removed and the crankshaft and flywheel dropped as a unit before the flywheel can be taken off. This was observed recently in a service station where a car using this engine came in with several of the flywheel teeth stripped. Fig. 3 shows why the lower crankcase has to be removed, the bearings disturbed and the shaft and the flywheel taken off together. The flywheel housing follows the contour of the wheel too closely and is further dropped at the open end, evidently to accommodate the No. 5 S. A. E. bell housing. Even if flywheel bolts are removed, there is not enough clearance to slip wheel through housing.

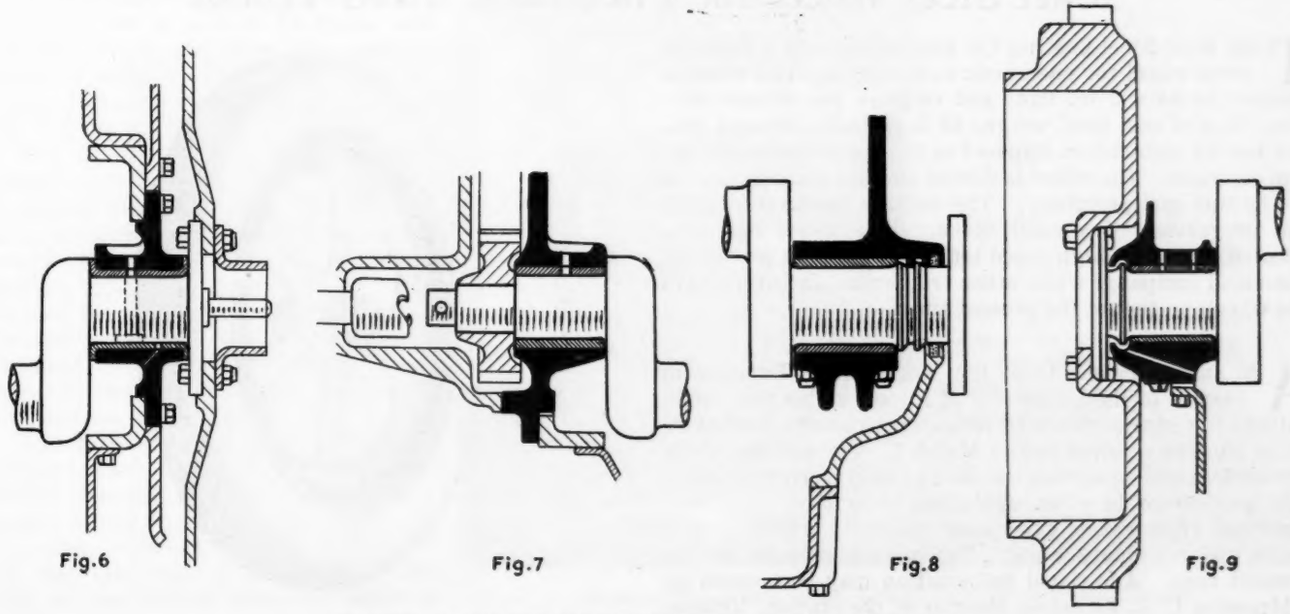


Fig.6 Fig.7 Fig.8 Fig.9

Examples of good and bad practice in main bearing installations

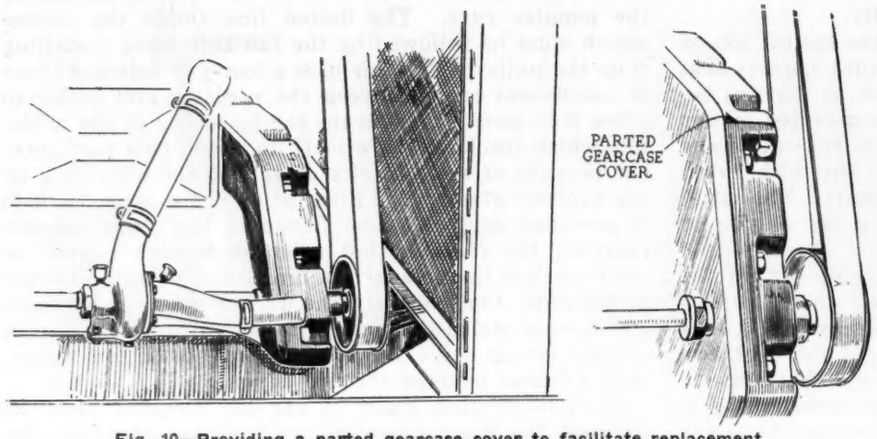


Fig. 10—Providing a parted gearcase cover to facilitate replacement of the pump drive gear key has reduced the maintenance cost materially in this case

There is an instance of a maker using a self-aligning bearing in the flywheel as a pilot bearing for the clutch shaft. It so happens that when a repair man has to slip the clutch assembly into place, he cannot lift the rear end sufficiently to allow the clutch shaft to enter horizontally into the pilot bearing. The self-aligning feature of the bearing makes the job difficult because the inner member cocks and no amount of coaxing will help. Mechanics say that when this job is necessary they simply file the end of the clutch shaft enough to make a loose fit. This construction is shown in Fig. 4.

Some car makers apparently try to hide the water pump as much as possible, thus making the job of repacking the glands difficult. Pumps often are placed too low on the engine, as in the left view of Fig. 5. Here the radiator really ought to come off to permit a good job when repacking the pump. The location of the pump shown at the right is good. The gland is very accessible and the unit has been mounted high enough on the side of the engine to make for ease of maintenance.

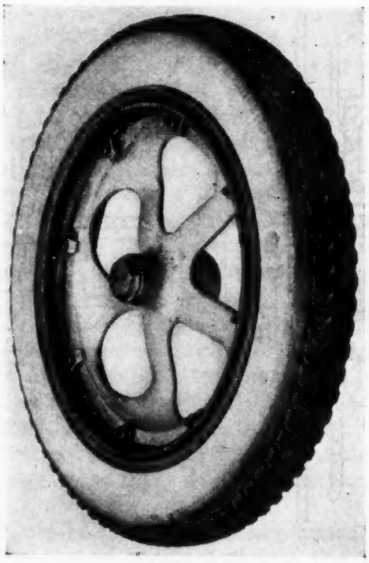
The job of getting at the main bearings on some engines is easy, but it is exceedingly difficult on others. For instance, it costs about $35 to take up the wear in the rear main bearing on one popular make of car. The reason for this is that the bearing is of the split type (see Fig. 6) and is held in an end plate on the rear of the engine crankcase. To remove the bearing halves for filing, the entire engine has to be taken from the car, the timing gear case cover removed, the crankcase gear pulled, the rods disconnected, the flywheel removed and the plate holding the bearing taken off. The crankshaft and rear bearing can then be taken out through the back of the crankcase, and the bearing can be dismantled. It is small wonder that this job is expensive. No provision is made on this same engine to take up wear in the front main bearing. This is a solid bushing (see Fig. 7).

Fig. 8 shows the very accessible rear main bearing layout used on another popular car. It will be noticed that the removal of the lower half of the crankcase brings the bearing cap into as accessible a position as could be desired. Another bearing layout that is difficult to get at is shown in Fig. 9. Here the flywheel shape and bolts do not allow the cap to come off unless the bearing bolts are raised sufficiently. The real job, however, lies in getting the bolts back into the holes, because a wire must be bent to take the heads of the bolts and the bolt heads must be juggled into position. Some type of flathead bolt on the flywheel would help.

Fig. 10 shows how one builder made it possible to save many hours of labor on the job of putting in a new key on the water pump gear. In the old construction it was necessary to take off the radiator, the entire timing gear case cover and several other parts to get at the key eventually. The newer models are made with a parted gear case cover so that only one end of it need be removed to get at the gear. This was a distinct step toward the saving of time and money on service.

Cast Steel Wheel for Pneumatic Tired Trucks

THE West Steel Casting Co. has brought out a light express wheel for pneumatic tired trucks. The wheel is adapted to 34 x 5 in. tires and employs the demountable rim. It is of cast steel, weighs 37 lb. without tire and rim, and has its material so disposed as to give considerable lateral strength. The wheel is dished and has reinforcements at the hub and periphery. The outside appearance gives the impression of a solid spoke. This wheel has been adopted for a new high speed truck put out by a prominent Cleveland company, while other truck manufacturers have the wheels on test at the present time.



A new cast steel truck wheel

AN announcement from the Engineering Experiment Station of the University of Illinois states that applications for appointments to Research Graduate Assistantships must be received before March 1. The assistantships are maintained to extend the field of engineering research and preference is given applicants who have had some practical engineering experience following completion of their undergraduate work. Ten vacancies exist at the present time. Additional information may be secured by addressing C. R. Richards, director of the station, Urbana, Illinois.

A Simplification in Making Sheet Metal Pressings

By the use of an hydraulic bag the need for a male die is obviated. For making fenders and similar parts the female die can be made of cast iron, with only sufficient tooling to remove the roughness of its surface.

IN the manufacture of such sheet metal parts as automobile fenders by the conventional methods it is necessary to have both a male and a female die, or a die and a punch as they are sometimes called. For such large pressings the expense of the dies is naturally a big item, especially if only a moderate number of the pressings are required, and numerous attempts to reduce the cost of the dies have been made recently.

A process of making such pressings which seems to hold out promise of material savings on the cost of dies has been worked out in Australia and is known as the Hydro Press process. Efforts are now being made to introduce it into this country. While it is obvious that the saving on the cost of production due to the elimination of the male die looms larger in countries where cars and bodies are produced on a smaller scale than they are here, nevertheless the process should be of interest to our manufacturers.

In the Hydro Press system the female die is of cast iron and requires only to be tooled sufficiently to remove any roughness in the casting so as to give a smooth and even surface. The place of the male die of the old system is taken by another cast iron die containing the bag-cavity; this only requires to be shaped sufficiently to insure that the surface of its top edge shall fit truly to the surface of the bottom edge of the female die; and, in place of an accurately fitting male die, there is placed in the bag cavity a reinforced rubber bag capable of being expanded by the injection of water under high pressure.

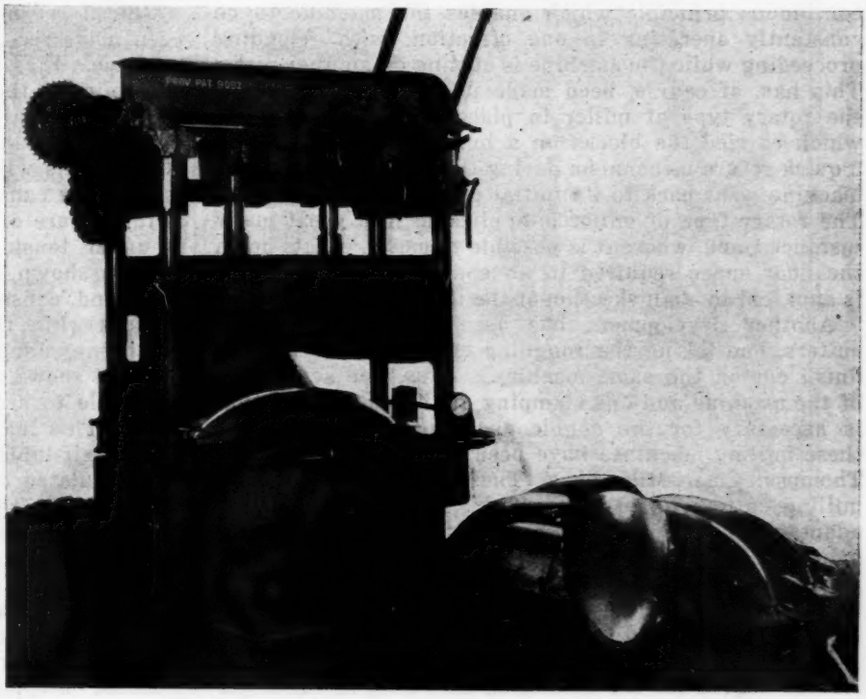
The necessary plant for the Hydro Press system is said to be cheap and simple, and it is claimed that certain types of machine at present in use in many factories can be adapted readily for the purpose.

The Hydro Press Company's machine consists of strong uprights, carrying overhead gear which operates a shaft with two eccentrics or cranks to which the female die is attached by two connecting rods. The female die is thus raised and lowered by the movement of the shaft; when lowered it closes on the bag-cavity die, the re-inforced rubber bag being in position.

The sheet of metal to be pressed to shape is laid on the rubber bag. The metal female die, which grips the edges of the sheet between itself and the edges of the bag-cavity, is lowered by the operation of the cams. The tap of the single pressure main is then turned on by the operator, and the resulting expansion of the bag forces the metal to the shape of the female die. (The normal working pressures used in Melbourne by the Hydro Press Co. vary from 300 to 750 lb. per square inch.) The pressing to shape of the metal sheet is a matter of moments, and the release of water and the separation of dies enables the completed work to be replaced by another sheet of metal.

We understand that the Hydro Press Co., Pty., Ltd., the proprietor of the patents, has been operating the system in Australia for about two years. For the first 18 months it confined itself to the production of automobile body panels, of which it turned out 5200 for one firm. Lately it has taken up the manufacture of aluminum kitchen wear by the same process.

ACCORDING to German patent No. 307,611, a cheap absorbent material for cleaning and polishing purposes can be produced by treating spinning paper waste with alkali and letting the alkali solution dry on the paper. The absorbent capacity of the waste is thus improved and the paper waste, moreover, has a rust-preventing effect on iron. Generally such paper rags facilitate the recovery of oil, because, when boiled, they form lye, and the impurities of the oil are absorbed by the lye and the paper fibers, while the oil floats.



Press of the Hydro Press system, with some of its products

Initial Milling Operations Speeded Up

Development of continuous milling has enabled manufacturers to proceed with initial operations on cylinder blocks and other heavy castings as rapidly as with other work in the plant. The following article describes one machine which has been developed for this special purpose.

By J. Edward Schipper

IN any production layout there is usually one machine or one process that is slower than the other processes. The rate at which the work can proceed through that machine or process is what determines the rate of production of the entire shop. In automobile engine manufacture this has generally been the initial milling operation. This has been particularly true on cylinder blocks where it is necessary to take, even off the most closely molded casting, a rough and finish cut on three and sometimes four sides of the block. Once having passed through the rough and finish milling operations, which really rough out the cylinder block and start it on its way through the production line, the other operations, which are far lighter in the amount of material taken off and far more susceptible to simple jigging and location, proceed rapidly.

Within the last two or three years, however, this condition has been changed. The development of continuous milling has brought the initial operations on cylinder blocks or other heavy castings to a point where the work proceeds as rapidly in this department as it does in others, and a material increase in the production possibilities has been made, although the space required has actually been decreased. There are several reasons for this increase in efficiency. The first is the use of the continuous principle which enables the machine to be constantly operating in one direction, with reloading proceeding while the machine is cutting on another piece. This has, of course, been made possible by the use of the rotary type of miller in place of the planer type, which carried the blocks on a long table and required a quick return mechanism during the period in which the machine went back to its initial position for a new cut. The rotary type of miller is applicable in a great many instances, and, where it is possible to use it, it cuts down the floor space required to an enormous degree. This is apparent by an inspection of the illustrations herewith.

Another development has been the use of double cutters, one taking the roughing cut and the other the finish cut on the same machine. Thus, one setting up of the machine and one clamping of the piece is all that is necessary for the double operation. A number of these milling machines have been made by the Davis & Thompson Co. of Milwaukee. These have been made with milling cutters up to 16 or 18 in. in diameter and are adaptable to a great variety of purposes. Fig. 1 shows one of these machines in operation on the Herschell-Spillman six-cylinder blocks. As will be seen, the rotary table on this machine carries nine six-cylinder blocks. Both ends are milled at the same time.

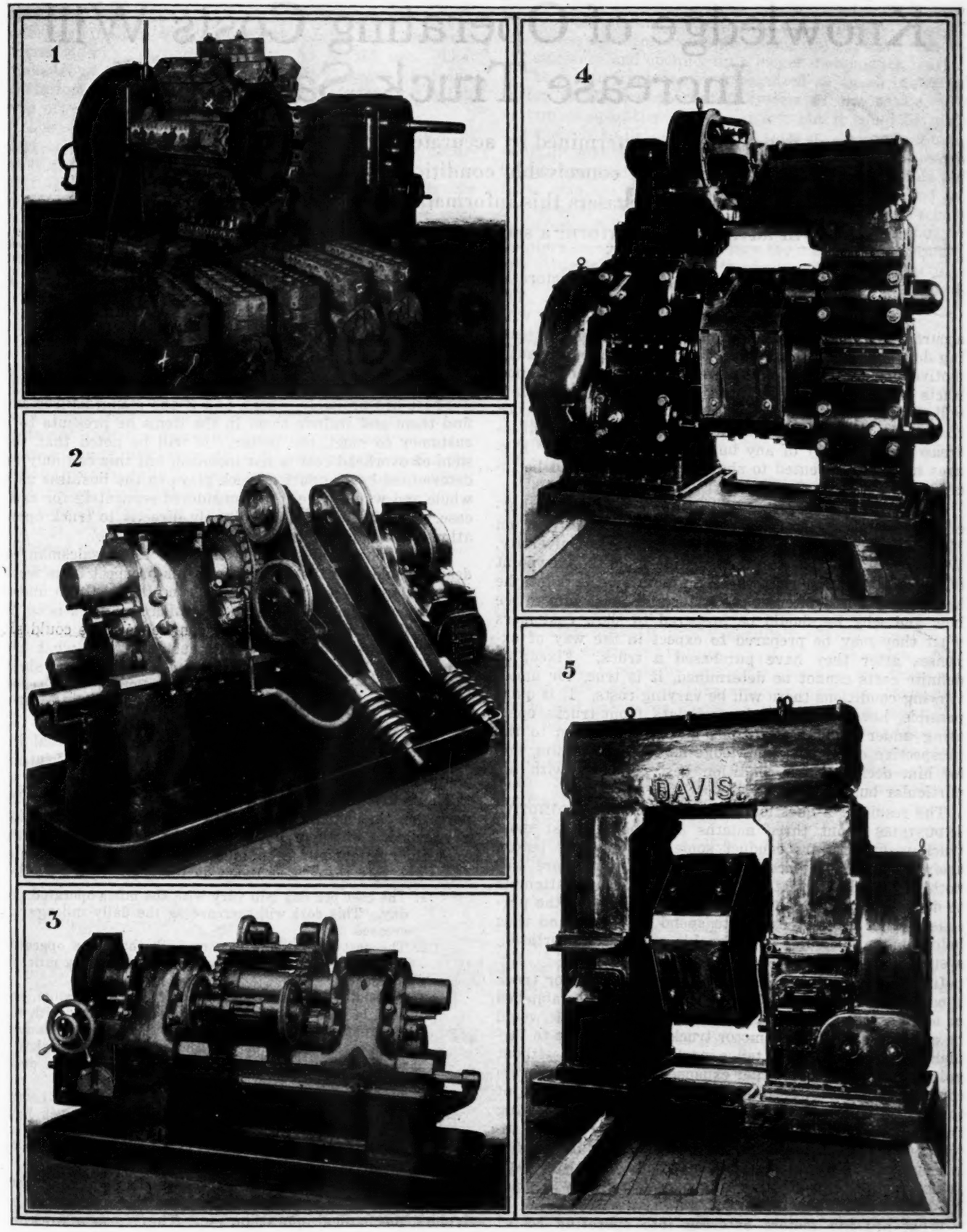
This same type of milling machine is used on the Ansted engine for the Lexington cars and, in the latter factory, is so arranged that nothing will interfere with the use of an overhead crane to apply the work to the work drum. An installation of this same machine is used at the Chevrolet factory to mill the ends of the Chevrolet blocks. This is a similar type of installation, the end fixtures being steel, hardened and ground and act as pistons, entering the cylinder block to locate it accurately. The operator simply slips the slotted clamp in place, tightens the nut and the blocks can be milled to micrometer measurement. On this type of installation the production runs 60 to 80 an hour.

One of the features of this type of machine is that a large variety of work can be done, particularly on the No. 3 machine, by having extra work drums which can be changed in a few minutes. It is only necessary to remove six bolts to take off the work drum and, consequently, this replacement is easy. An adaptation of the Davis continuous milling machine is used for milling simultaneously both ends of the Fordson tractor crankshaft. The holding fixtures on this particular installation are extremely simple. The shafts are laid on the work mandrel flange and crank-handle end alternately and are centered by hardened steel blocks. One set of slotted clamps holds each shaft. The operator, consequently, needs only to tighten the nuts when the shafts are ready to be milled. The production runs from 75 to 95 crankshafts per hour on this installation.

One of the most interesting developments which has been made recently is the use of rope clamping on this machine. Figs. 2 and 3 show the rope clamping method as applied to the end milling of the Chevrolet camshaft. With this installation it is possible to go as high as 360 camshafts per hour. The machine is at present turning out 300. As will be noted, all the operator has to do is to drop the camshaft into the V block and the clamping is taken care of automatically by the wire cable which is under tension around the pulley. The heavy coil springs shown in Fig. 2 hold the tension on the rope cable and, consequently, firmly hold the camshaft in the V block while the milling operation is taking place. A great many adaptations of this machine have been made.

Fig. 4 shows a new model known as the 2½, which is adaptable to crankcase, cylinder head or other similar work. This machine will take 16-in. cutters or larger and is self-lubricated, the oil being carried in the base and circulated by oil pump. Micrometer adjustments of each spindle are provided. The same machine from the operator's side is shown in Fig. 5. All of these machines are designed to be truly continuous, with the operator placing work to be milled in the fixtures without delaying the cycle, and the milling time, consequently, becomes the chucking time. A feature of the machine is that all cutter spindles have micrometer adjustments, are mounted on opposed cone bearings and are solid from end to end. Gears are provided to give a change of feed of from 3 in. to 30 in. per min. past the cutter.

New Machines for Rapid Milling Operations



1—Davis continuous milling machine, rough and finish end milling Herschell-Spillman six-cylinder block. 2—Wire cable clamping method used on Davis continuous miller operating on Chevrolet camshaft. 3—Chevrolet camshaft operation showing simple location of shaft in V-block with wire cable clamps. 4—Davis continuous miller No. 2½ model, capable of taking 16-in. or larger cutter. 5—Operator's side of model 2½ Davis continuous miller.

Knowledge of Operating Costs Will Increase Truck Sales

Such data should be determined by accurate records obtained from actual operation under every conceivable condition. The manufacturer who gives prospective purchasers this information and helps him determine costs in advance will perform a service to himself, customer and industry.

OPERATING cost is one of the principal factors in determining the efficiency of a motor truck. The manufacturer who can furnish his salesmen with accurate and all-truthful data along this line will be tearing down one of the highest barriers to sales, for the automotive market now contains fewer men who buy on chance. Facts as to what a motor truck will do and how much it will cost to do it are demanded by the prospective truck customer. The mere statement that a motor truck will increase the efficiency of any business is not enough. Figures must be presented to show how efficiency will be increased.

The subject of operating costs is gone into rather thoroughly in a book by F. Van Z. Lane, C.E., Lecturer on Motor Truck Transportation at New York University. While the author takes up the question from the viewpoint of the owner rather than the manufacturer, the points he brings out should interest the latter and cause him to see how and why he should be prepared to show customers what they may be prepared to expect in the way of expenses after they have purchased a truck. Fixed, or definite costs cannot be determined, it is true, for under varying conditions there will be varying costs. It is quite possible, however, to obtain cost data from trucks operating under various conditions and thus pass on to the prospective owner the knowledge as to their results, and let him decide which condition best coincides with his particular business.

The result of a questionnaire published in AUTOMOTIVE INDUSTRIES about three months ago showed that most truck manufacturers conduct some sort of tests before their vehicles are placed on the market, but there was nothing to indicate that any single manufacturer attempts to determine actual operating costs so he can tell the purchaser what he may expect to spend per year, and thus help him to efficiently organize his motor transportation system.

Information as to the operating costs of a motor truck should be all-truthful. Confidence cannot be established or maintained if only a part of the truth is told. It would be quite possible for the motor truck manufacturer to furnish figures that would tell a part of the story without going into details as to other expenses, but such a program could only prove disastrous in the end. On the face of things it might seem that competition would forbid setting forth all the facts available, but truck purchasers are intelligent enough to see that the salesman who includes in his figures all the factors that enter into operating costs is not trying to "put something over," and he will place his confidence in that salesman.

What are the factors entering into operating costs? Mr. Lane divides them into three headings, which are subdivided as follows:

Investment	Fixed	Variable
Chassis	Interest	Fuel
Body	Insurance	Lubricants
Cab	License	Maintenance
Freight	Driver's wages	Tires
War tax	Garage rent	Sinking fund
Special equipment		

There are probably others, and if the manufacturer can find them and include them in the items he presents to a customer so much the better. It will be noted that the item of overhead cost is not included, but this can only be determined by the part a truck plays in the business as a whole and would have to be considered separately for each case. The factors mentioned apply directly to truck operation while engaged in transportation service.

Does it not seem plausible that the truck salesman or dealer would gain the confidence of his prospect if he were able to show his prospect what these costs have been under conditions similar to those under which the truck is to be used? Would he not gain more confidence if he could sit down and figure fairly with the customer just what the truck would have to do under normal conditions and show him what it was going to cost? After that the truck manufacturer would do well to supply the purchaser with cost sheets that he might keep an accurate record of the cost of operation. These records would furnish real information both for the manufacturer and for future prospects.

There are certain laws governing motor truck transportation that should be known to every truck owner, for a knowledge of them might have an important bearing upon the efficient and economical operation of the vehicle. Mr. Lane sets these laws down as follows:

1. The cost per day will vary with the miles operated per day. This cost will increase as the daily mileage increases.
2. The cost per mile will vary with the miles operated per day. This cost will decrease as the daily mileage increases.
3. The daily cost unit (per ton, per bag, per gallon, per bale, box, or whatever unit is used) will vary with the different truck capacities and the distance hauled. This cost will decrease with an increased truck capacity and it will increase with an increase in daily mileage.
4. The cost per unit mile (per ton mile, etc.) will vary with different capacities and the miles of truck haul per day. The cost will decrease as the capacity increases and it will decrease with an increase in daily mileage.

These laws apply only, of course, when other conditions are equal, such as road and traffic conditions, efficiency of drivers, mechanical operation, etc. They form a working basis, however, for the manufacturer to obtain actual operating costs and pass that information on to the man

who buys a truck. A knowledge of them will clear up many apparent inconsistencies in comparing the cost of operating one truck with another. Such knowledge is necessary if the prospective truck operator is to determine correctly what capacity of truck he should use. They make comparisons possible with other means of transportation, and enable the operator to ascertain his actual cost of operations with his truck.

The importance of furnishing cost records cannot be over-emphasized. In no other way can an operator accurately determine what his motor transportation system is costing him. It is estimated that of some 900,000 trucks in operation, only about 50,000 have their operating costs determined by records. This situation is one that should be overcome. The business man keeps accurate records of the cost of his production, labor, advertising, selling and all other departments, but disregards his transportation, hauling and delivery costs, yet they play an important part in his business. A systematic analysis of these costs, together with a study of the laws with a view to decreasing them, would go a long ways toward increasing efficiency and opening up a larger motor truck market.

The motor truck is now recognized as an all important factor in the transportation system of the nation. Its system of operation is not perfect, but it could be made more nearly so if the operations were carried on in a more scientific manner. The manufacturer is the logical person to take the lead in a movement to make this possible and those who are the first to take steps along this line are apt to be the ones who will profit most. Mr. Lane's book is an interesting one from many other standpoints, but his chapters on operating costs show the need for such studies, and bring forcibly to mind the fact that the manufacturer has done too little to educate the buyer along these lines.

A New Single Plate Clutch

IN the new single plate type of clutch shown in the accompanying cut there are twelve springs acting directly upon the friction surfaces. The springs are so proportioned that the decreased pressure produced when the friction mats are worn is still sufficient to make the clutch operate within the recommended capacity. The springs for each clutch are calibrated and held within a tolerance of two and one-half pounds at normal load. Springs with a normal load of 130 lbs. up to 170 lbs. are provided as required.

The pressure plate is connected to the levers and is positively drawn away from the friction mats to prevent dragging upon disengagement.

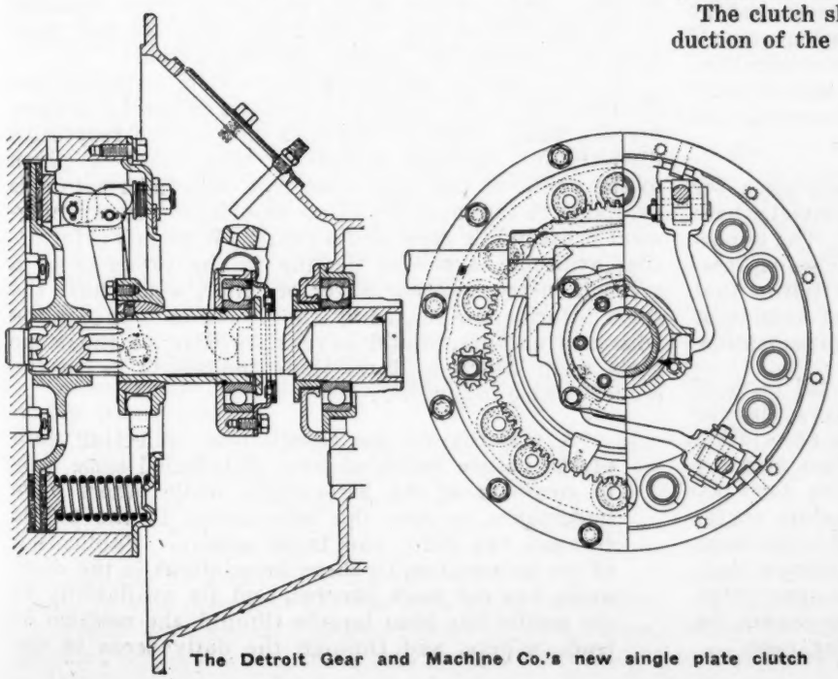
The friction mats are of woven asbestos 6⅞ in. inside by 9⅞ in. outside diameter and 5/32 in. thick. They are of the floating type with a total area of wearing surface of 158 sq. in. The pressure per square inch of friction surface is 20 lb. for the 130 lb. springs and 26 lb. with the 170 lb. springs. The clutch is made in 10-in. size to fit a standard S.A.E. flywheel.

The toggle levers used to disengage the clutch are held firmly in both engaged and disengaged positions to prevent rattle. The inner ends of the toggle levers are held in a ball and socket hub which adjusts itself automatically to equalize the pull on the levers. This prevents the sleeve from binding on the shaft when the balls of the toggles are not in the same plane or when the pull on the levers is not equal.

The throwout bearing is a special deep grooved annular thrust bearing held in a container with ample lubricating capacity. The lubricant is fed to the container through a tube arranged to connect with a cup conveniently located on the floor boards of the car. The throwout sleeve is of hard bronze grooved for lubrication. Oil holes along the side of the shoulder of the sleeve connect with the grooves through which the oil from the reservoir passes.

A clutch brake is provided and is effective until mats have worn enough to require adjusting of the clutch. The adjustment is made by turning any one of the three adjusting nuts, which in turn raise or lower the three fulcrums and bring the sleeve to its proper position. All three adjusting nuts have gear teeth which engage with mating teeth in a ring of sheet metal which operates them simultaneously. The ring is held in place by three spring clips. No loosening or tightening of screws is necessary for making an adjustment. The adjusting nuts are accessible and take a standard open-end wrench.

The clutch shown is known as model N and is the production of the Detroit Gear and Machine Co.



The Detroit Gear and Machine Co.'s new single plate clutch

A Tractor Export Chart

A CHART showing the quantities, value and destination of all farm tractors exported is being prepared in the statistical section of the Agricultural Implements Division of the Department of Commerce. Statistics of exports will be added to the chart each month for the month preceding, so that figures will be available at all times showing the exports for any period.

The Agricultural Implements Division will now handle all tractor statistics, instead of merely farm tractors. Under a former arrangement the section was only concerned with farm tractors, while others designated as commercial tractors were in the hands of the Automotive Division. The Agricultural Implement Section has on file valuable information for the tractor manufacturer or exporter.

Hoover and Daugherty Discuss Status of Trade Associations

In correspondence recently made public, the Attorney-General gives informal approval to the collection of statistics concerning production, stocks, wages, etc., if they are made public at same time they are received by members. Discussion helps define legitimate trade association functions.

THE Hoover-Daugherty controversy concerning trade associations has a definite interest for every manufacturer, regardless of the industry in which he is operating. The last issue of AUTOMOTIVE INDUSTRIES being the annual Statistical Number, it was impossible to devote to the recent developments of this controversy the space necessary for a proper understanding of the present situation. The correspondence between Hoover and Daugherty about trade associations has just been made public and is worth close study.

The correspondence begins with a comprehensive and sound analysis by Hoover of the entire trade association situation. Hoover points out the necessity for legitimate trade association activity and presents the reasoning leading to his conclusions. His opinion is a bit too long to print here in full, yet it presents so excellent a résumé of the situation that certain parts are necessary to a proper understanding of any analysis. Hoover wrote in part:

"Commercial progress in industry has always been measured by the advance in knowledge of those engaged in industry. It is impossible for men to acquire or secure all possible knowledge at one time. Its acquisition is a growth resulting from continuous, intelligent inquiry. The knowledge of an industry that is necessary and essential to its success must embrace all facts and circumstances that will in any way influence that industry. These facts and circumstances must include economic conditions as well as scientific facts to the extent that science is called into play in its operation and all commercial conditions that make for efficient production, merchandising and distribution. No one will dispute the foregoing statements; they are fundamental and necessary to the life of trade and commerce.

"Trade associations have been in existence for many years. The great majority are legitimate, both in form of organization and in activity. The minority, while lawfully organized under articles expressing lawful purposes, may engage in activities that are evidence of purpose contrary to and outside of the declared purposes in the articles of organization.

"Again, a trade association may have lawful form of organization and the activities of its officers may be clearly within the purposes declared in the association charter, and yet members of the organization may, by unlawful confederation, use the information lawfully secured for unlawful purposes. It may, therefore, truthfully be said that the line dividing the good association and the bad, the proper activity from the improper one, and the lawful activities of the officers of an association from the unlawful acts of the membership cannot be determined, in every instance, with singular ease.

"It is with much earnestness that I claim there is propriety, generally speaking, in trade associations. Their lawful field of endeavor is large, and their activities work for promotion and advancement of the public welfare and for progressive economic organization. In making this statement I am not unmindful of the fact that the impression exists with a small minority that individual prohibited acts may be accomplished by organization under the disguise of a trade association.

"Information lawfully secured regarding trade and economic conditions made public for the information of everyone cannot be harmful. Information secured solely for the benefit of members and of a character that puts the membership, by reason of the information, in a position of advantage, as compared with the public without such information, cannot be sanctioned by sound public policy.

"The activities of trade associations that have received the greatest criticism involve the collection of statistics relating to volume of production, capacity to produce by districts of production, wages, consumption of products in domestic and foreign trade, distribution thereof, including volume of distribution by districts, together with figures as to stocks on hand, wholesale and retail, by districts, coupled with information as to price, either in the form of individual reports of each member distributed to every other member or the individual prices reported to the association and by the latter compiled and averaged by districts for certain specified periods.

"If information regarding production, capacity and distribution by districts, with average prices for grades, brands, sizes, styles or qualities sold in the respective districts for specified periods of time could be given to the public at the same time that such information is available to the members of an association, in my judgment great public good would result. With this information available, everyone dealing in the products of a given industry, whether buyer or seller, would have the same information regarding conditions and, in dealing with one another, would have knowledge of the same facts upon which to form their judgments as to the proper course to pursue.

"A majority of the associations collecting data of the nature indicated have distributed same only to members of the association, while others have undertaken to give the information to the public through the daily and trade papers. Publication of the information by these associations in the daily press has not been general, and its availability to the public has been largely through the medium of trade papers, and through the daily press to the

extent that the latter may have been utilized. When published through trade papers this information should be released to members only after such publication."

Hoover then goes on to ask the Attorney-General 11 questions dealing with the following subjects:

1. Uniform cost systems.
2. Standard nomenclature.
3. Standardization in quality and grades of product.
4. Collecting of credit information.
5. Insurance.
6. Co-operative advertising.
7. Co-operative welfare work.
8. Co-operative handling of legislative questions.
9. Co-operation with Federal Government.
10. Collection and dissemination of statistical data concerning production, wages, stocks, distribution, etc.
11. Exchange of price information.

The tenth item is specially important. The fundamental purpose of statistical data concerning industry is constructive. It is to enable organizations within an industry and those allied with an industry so to analyze their markets and correlate their various organization activities that the industry may be conducted on the most efficient basis, eliminating as much waste as possible and making the conduct of the business render greater service to the public and greater returns to the various independent organizations.

Hoover's tenth question, in detail, was as follows:

(A) May a trade association collect statistics from each member showing his volume of production, his capacity to produce, the wages paid, the consumption of his product in domestic or foreign trade, and his distribution thereof, specifying the volume of distribution by districts, together with his stock, wholesale or retail?

(B) And may such trade association, on receipt of the individual reports of each member, compile the information in each report into a consolidated statement which shows the total volume of production of the membership, its capacity to produce by districts of production, which, in some instances, include a State or less area, the wages by districts of production, the consumption in foreign or domestic trade by districts, the volume of distribution by districts and the stocks on hand, wholesale and retail, by districts?

(C) And if, after compiling the information as aforesaid, the information received from the members, as well as the combined information, is not given by the association to any other person, may it then file the combined statement with the Secretary of Commerce for distribution by him to the members of the association through the public press or otherwise and to the public generally and to all persons who may be in any way interested in the product of the industry, it being understood that the individual reports for the members should cover either weekly, monthly, quarterly or longer periods as may be deemed desirable by the members, and, when a period is adopted, the report for each member shall cover that period, and the combined report shall be for that period?

The rather brief and somewhat indefinite reply of the Attorney-General, however, apparently finds no objection to the activities of the associations covered by Hoover's questions as regards standard nomenclature, standardization, credits, group insurance, co-operative welfare work and co-operative handling of legislative problems.

Only in two instances did the Attorney-General find any specific objections. These had to do with the clause regarding uniform cost systems and a part of the clause about co-operative advertising. The questions involved read as follows:

1. May a trade association provide for its members a standard or uniform system of cost accounting and recommend its use, provided that the costs so arrived at by the uniform method are not furnished by the members to each other or by the members to the association and by the latter to the individual members?

6. May a trade association, in co-operation with its members, engage in co-operative advertising for the promotion of trade of the members of that association engaged in the particular industry; and may the association engage in such form of promotion by furnishing trade labels, designs, and trade-marks for the use of its individual members?

The comments of the Attorney-General on these questions were as follows:

"With reference to the first paragraph, there is no apparent objection to a standard system of cost accounting, but I think associations should be warned to guard against uniform cost as to any item of expense.

"Furthermore, I have serious doubts about the advisability of the latter part of the sixth paragraph. I can see no objection to co-operative advertising designed to extend the markets of the particular article produced or handled by the members of an association, but when the several producers or dealers use uniform trade labels, designs and trade-marks it seems to me the inevitable result would be a uniformity of price."

The last paragraph of this letter covered all of the other questions raised, and clarifies the discussion to a certain extent, although it cannot be said to give any very definite conclusions, taking into consideration the lack of positiveness which characterizes the language used and the fact that the expression of opinion is only informal in nature. The final paragraph is as follows:

"I can now see nothing illegal in the exercise of the other activities mentioned, **provided always** that whatever is done is not used as a scheme or device to curtail production or enhance prices, and does not have the effect of suppressing competition. It is impossible to determine in advance just what the effect of a plan when put into actual operation may be. This is especially true with reference to trade associations whose members are vitally interested in advancing or, as they term it, stabilizing prices, and who through the medium of the associations are brought into personal contact with each other.

"Therefore, the expression of the view that the things enumerated by you, with the exceptions stated, may be done lawfully is only tentative; and if in the actual practice of any of them it shall develop that competition is suppressed or prices are materially enhanced, this department must treat such a practice as it treats any other one which is violative of the anti-trust act."

In reply to Daugherty's letter, Hoover makes a brief explanation of the meaning of the clause in his question regarding co-operative advertising which indicates that what Hoover has in mind is really in accord with what Daugherty believes necessary. Hoover then ends his letter of reply by saying, "With this explanation I feel sure you will agree with me that our views on the matters presented are in complete accord."

Apparently no reply denying this final statement has been received, so it would seem that for practical purposes it can be assumed that trade association activities are legitimate so long as conducted within the limits indicated by Hoover's questionnaire. Thus the case seems to rest for the present.

Advantages of Grease as a Chassis Lubricant

Editor, AUTOMOTIVE INDUSTRIES:

We have carefully read the very interesting article written by Mr. Cornelius T. Myers, appearing in AUTOMOTIVE INDUSTRIES for Dec. 1, 1921, entitled "Various Methods of Chassis Lubrication." We thoroughly agree with the author of this article that failure to properly lubricate automotive chassis is one of the greatest causes for the depreciation of the entire vehicle, leading, of course, to unnecessary and highly expensive repairs. Notwithstanding the very able way in which the benefits of oil lubrication were presented, it is our belief that not enough space in this article was devoted to the unavoidable difficulties standing in the way of its practical application on open bearings.

The question is not so much which is theoretically the best lubricant, oil or grease, as it is which of the two has given the best results in the past and is, all things considered, the best adapted for the job in hand. Mr. John Rome Battle in his book, "Industrial Oil Engineering," says:

"When the bearing load is heavy and the bearing surfaces are forced together, an oil is forced out of the bearing and metallic contact will occur. With a grease, as the surfaces approach, the shearing action decreases until a point is reached, when 'flow in the film' ceases, and the film will not become any thinner. Thus metallic contact is prevented. This feature of grease lubrication is an important factor governing the selection of greases for lubrication, particularly for those bearings which are operated at low speeds and high pressures, especially where the bearing may be at rest for some time. Here the starting friction must be overcome when the bearing surfaces are again given relative motion.

"The importance of the effect of the thickness of the lubricating film must be emphasized. If all surfaces in bearings were perfectly smooth there would be no tendency for the projections to interlock. Since this is not possible, however, it must be appreciated that with oil lubrication the lubricating film may become so thin that when the relative rubbing motions of the surfaces are low, or when the surfaces are at rest, while they do not actually touch, they do to some extent interlock. This causes the starting friction to be larger than the friction of motion.

"When grease is used as a lubricant under the above conditions the film between the surfaces of the bearing will not allow its being pressed to thin enough dimensions to permit interlocking. The starting friction with grease is, therefore, a factor depending upon the shearing resistance offered by the film."

The foregoing we have quoted in full, as it seems to us to be a very concise statement by a recognized authority on the superiority of grease over oil as a chassis lubricant, as the conditions above described exactly fit those obtaining in an automotive chassis bearing.

In contradiction to this, the article above quoted dismisses grease in most summary fashion. In fact, it states that most greases contain a soap or other inert matter which makes them more or less heavy, but which have a negative qualification as a lubricant. In other words, this article gives the impression that the only value of a lubricant is the mineral oil in it, while, as a matter of fact, the excellence of the vegetable or mineral oil out of which the soap base is made determines in a number of cases the excellence or deficiency of a grease.

Any chemist who has analyzed any of the good greases on the market at the present time, particularly those recommended for chassis lubrication, knows positively the infinitesimal percentage of non-lubricating matter in them. In fact, I have in mind a lubricant made by the Sun Oil Co., as well as one manufactured by the Texas Co., which contains no non-lubricating matter whatsoever, which is true, likewise, of many lubricants manufactured by the Warren Co., Fisk Co., etc.

So much for a brief discussion of the benefits of grease as a chassis lubricant, a subject on which there will always be much difference of opinion. However, the fact remains that over 400 separate and distinct automotive engineering departments in this country, containing perhaps the best theoretical and practical engineering minds in the profession, have adopted grease as the proper lubricant for automotive chassis.

The article goes on and condemns grease by the statement that handling a grease container about a car is always a dirty job. The question might be asked. What of the oil that slops from the can? That too is a dirty job, and this spilling is absolutely avoided by the use of grease. But in order to insure cleanliness there are at the present time patented cans on the market which permit the filling of pressure system compressors without the lubricant touching the hands.

Compare, if you will, the picture of an unsightly oil cup—the dirty oil oozing from the bearing seeping down on the leaves—with the nickel plated Alemite fitting. These fittings make the lubricating points of a car not mud heaps, but symmetrical and highly polished points, which assist rather than nullify the labor spent on the rest of the car to make it as pleasing to the eye as it is efficient to operate.

The statement that fittings and hose sooner or later accumulate dirt which is forced into the bearings is unwarranted, for there is in each fitting a little check valve sealing the entrance against the dirt even when the dust cap, an added precaution, which fits snugly over the fitting, is not used. Dirt, of course, can be forced into the hose, but even this is difficult because the hose is generally full of grease, which in itself prevents the entry of dirt particles.

That water will enter the fittings, we believe is an exaggeration. In fact, the writer has lubricated the chassis on his car for the last year with nothing but a grease that will emulsify. He has continually washed his car with a hose, and in each case if water entered the bearing it would have been immediately noticeable; whereas, as a matter of fact, no such accident was observed.

We do not desire, however, that the case be settled by theory, even though we believe theoretically grease is

fully established as being superior to oil as a chassis lubricant. It is on actual performance for the purpose intended that the controversy should be settled. Countless automobile engineers who have tried oil, some if not all of whom must have been fully cognizant of the virtues attributed to oil for chassis lubrication and who must have had presented to them all the various types of oil cups, have discarded them and come to grease as the logical, practical and most efficient method for chassis lubrication.

J. HENLY FRIER, JR.

Transmission Gear Losses and Wear

Editor, AUTOMOTIVE INDUSTRIES:

Supplementing the communication of G. A. Ungar in the issue of Jan. 26, it is evident that transmission efficiency is almost wholly dependent on the character of the lubricant. Invariably semi-fluid grease lubricants are used in order to produce quiet operation of the gears. As indicated in the communication, the lower efficiency of the transmission is particularly evident under winter driving conditions when the temperatures are low, and it is easily understood how the lubricant affects the efficiency by the gear shifting difficulties that are experienced.

Under ordinary operating conditions, the high gear or direct drive is used 90 per cent of the time, under which conditions it certainly is not desirable to have any of the other gears in mesh.

From experiments conducted over several years, with a transmission having a stationary countershaft in high gear, a considerable increase in efficiency and an easier operating transmission have resulted. A relatively light oil can be used and perfect quietness obtained in high gear and the fact that the lubricant is not continually churned, the viscosity is well maintained.

A. A. BULL, Ch. Eng.
Northway Motor & Mfg. Co., Div'n General Motors Corp.

Farmer Buying Power

THE following figures, compiled by the National Bureau of Economic Research, are indicative of the general trend toward attempts at compilation of accurate and comprehensive statistical data for use in practical planning. The figures concern the buying power of the farmer and are the result of a long investigation.

In analyzing these figures, however, in their relation to the automotive industry, it must be realized that many factors, other than potential buying power, affect that actual potential farm market for automotive products. As total buying power decreases, of course, total buying will decrease, but this does not mean that the farmer will cease buying all products to an equal degree. In so far as cars, trucks, tractors and other automotive products constitute a necessary part of the farmer's business and operating equipment, such products will suffer a comparatively slight decrease in farm sales. Necessities will always be bought. Thus, automotive products will be sold to the farmer in proportion to their demonstrated value as economic necessities.

It is essential, then, that the following figures be used in planning with a proper perspective as to their significance. They tell an important part of the story of the farm market, but not by any means the whole story.

The farmers of the United States in 1918 and 1919 reached an unprecedentedly high level of total income, as compared with the rest of the gainfully employed. This is true, whether comparisons are made on the basis of absolute income or of purchasing power in terms of the dollar's power in 1913. Then, suddenly, in 1920, the farmer's share in the national income, in terms of prewar price levels, dropped to a point below that of any previous year in the decade 1910-1920. This fact is disclosed in the report of the National Bureau of Economic Research, now in press. The farmers, who represent about 6,450,000, or 16 per cent of the gainfully employed, have received during the past decade a share in the total national income varying between 12.3 in 1911 and 17.4 in 1917 and 1918, until 1920, when it dropped to 10.9.

The farmer's share, in billions of dollars and per cent of the total, is estimated by the Bureau to have been in each year beginning with 1910 as follows:

	Aggregate of Individual Incomes (billions)	Farmers' Income (billions)	Per Cent of total received by farmers
1910.....	$30.0	$3.95	13.2
1911.....	30.2	3.70	12.3
1912.....	31.5	4.00	12.7
1913.....	32.5	4.20	12.9
1914.....	32.2	4.20	13.0
1915.....	34.3	4.70	13.7
1916.....	41.8	5.80	13.9
1917.....	50.7	8.80	17.4
1918.....	60.2	10.45	17.4
1919.....	64.7	10.85	16.8
1920.....	65.8 (approx.)	7.20	10.9

The final figures for the total income in 1920 can at present be given only roughly, since the income tax returns have not yet been published.

When these figures are translated into terms of the purchasing power of "1913 dollars" it is again seen that the purchasing power of the farmers was at its lowest ebb in 1920. Here are the comparative figures in billions of dollars:

	Farmers' Income in billions of dollars at the uniform purchasing power of 1913
1910.....	$4.01 Billions
1911.....	3.78 "
1912.....	4.04 "
1913.....	4.20 "
1914.....	4.17 "
1915.....	4.59 "
1916.....	5.10 "
1917.....	6.45 "
1918.....	6.50 "
1919.....	6.10 "
1920.....	3.50 "

The per capita income in the country as a whole and the per capita income of the farmers, both measured in dollars of 1913 purchasing power, were as follows:

	Average income in 1913 dollars of all gainfully employed	Average income In 1913 dollars of farmers
1910.....	940	631
1911.....	923	593
1912.....	939	624
1913.....	955	657
1914.....	932	652
1915.....	1005	717
1916.....	1068	795
1917.....	1025	1004
1918.....	941	1011
1919.....	938	947
1920.....	850 (approx.)	543

It will be seen that in the first years of the decade farmers' incomes were considerably less than the average of the gainfully employed. In 1917-19 they were about the same. The farmers were, however, hit much harder by the 1920 fall in incomes than were the rest of us.

Improving the Dealer Contract

Necessity for stability in car dealer organizations is discussed. N. A. C. C. and N. A. D. A. working to eliminate present contract evils. Mr. Tipper shows problems and suggests methods for improving contracts which will be beneficial both to the manufacturer and to the retailer.

By Harry Tipper

THE difference between the retailer of automobiles, their accessories and service, and the retailer of ordinary commodities is nowhere more clearly demonstrated than in the character of the contracts between the manufacturer and the retailer or between the distributor and the retailer. Discussions which have occurred regarding these contracts and the present confusion existing between the practice of the manufacturer, the demands of the dealer and the general large tendency to change all indicate the difficulties connected with the proper scheme of development between manufacturer and retailer where the commodity is not sold but is to be kept running during its life.

It has been estimated from various sources that the mortality in car dealers during the year 1921 ran from 40 per cent to 50 per cent of the total number. This mortality is a serious matter in connection with the distribution of the automobile, much more serious than in the case of the ordinary commodity for the reasons previously mentioned. It is not very important to the individual toilet goods manufacturer if 30 per cent of the drug stores in that particular locality go out of business. The reputation of the manufacturer is not involved particularly in these changes, and the units of his distribution do not affect the market to the same degree.

In the business of distributing cars, the character, stability and operations of the dealer are bound up with the manufacturer of the car he is selling. They have a very important influence upon the position of the manufacturer in that locality and this influence has a tendency to grow as the business settles into its long stride and takes its place in the social and industrial fabric. No other product owned by the individual in social life requires so much attention. No other product is so complicated in its mechanical requirements and there is no other product used by the general public which has emphasized its own values and difficulties so thoroughly.

This point must be thoroughly understood if the position of the retailer is to be determined accurately. No other complicated machine has been sold to the public to be operated by amateurs. No product becomes a necessity so quickly as this convenient means of going about, and there is no other commodity which is expected to meet the calls upon it in the same way.

In all of these respects the retailer is the key man in his locality. His business methods, his capacity to deliver good service, the character of his establishment—all these seriously affect the reputation of the manufacturer in that locality. As the car becomes more and more clearly a necessity, as its novelty wears off and it takes its proper place this influence of the local retailer becomes more important. Consequently, it is to the manufacturer's interest to develop his stability, to arrange to aid his capacity along various lines and to see that he is in a position to conduct his business effectively.

Much discussion has developed among manufacturers and also among the retailers' associations concerning the contractural arrangements between the two, the methods of the manufacturer, and the dealer's efficiency in his business. There has been a good deal of mutual dissatisfaction with the situation which has expressed itself in the character of this discussion. A form of contract has been suggested by a combined committee of the N. A. C. C. and the N. A. D. A. designed to do away with a considerable part of the difficulty at present involved. It is important, of course, that the actual character of the contract and its wording should be equitable to both parties under all possible circumstances. It is equally important that the responsibility of both parties to the transaction should be understood by them and the contractural arrangements include a full understanding and a full discussion of all these matters.

It is to the manufacturer's interest to foster a stable, intelligent and thorough dealer organization in this field. It is up to him to study and understand the dealer's situation better than the dealer himself, because his future is involved in the stability and the business conduct of a number of dealers, whereas the individual is concerned only with his own conditions.

The statement has been made several times that there are not more than a few thousand dealers in the field who are thoroughly established and properly competent in all lines of their business. Similar statements have been made regarding the standing of dealers from a financial standpoint. These statements might be questioned, but they are indicative at least, and there is no doubt that the number of stable and efficient dealers is a comparatively small proportion of the total in the field. This is not the fault of the dealer but a necessary accompaniment to the rapid growth of the business and the constant entry of new dealers in the field, who have not yet had the opportunity to develop themselves to the highest point of efficiency and stability.

The problem before the manufacturer, therefore, is one of:

First—Securing those dealers who are capable of making a good outlet for his product and safeguarding his reputation, or those dealers whose intelligence, initiative and local standing indicate that they are capable of becoming stable and strong factors in their locality and, therefore, of value to the manufacturer.

Second—To consider carefully from his standpoint the investment which the dealer must make, the problems which the dealer must face and the importance of entering into contractural arrangements which will provide reasonably for contingencies and, at the same time, prove equitable to both parties in case of changes either in the manufacturer's organization or the dealer's position.

Third—To provide such organization developments as will put the full knowledge of the manufacturer at the disposal of the dealer in the effort to improve the dealer's position as the manufacturer's representative in that territory, with the full responsibility for keeping the market in good shape at all times in that locality. The contract, of course, is a matter upon which these items hinge, and it is likely that the form of contract will have to change as the business grows older, stabilizes itself and develops its characteristics more fully.

At the end of 1921 there was a good deal of grumbling among dealers because some of the manufacturers had obliged them to take their quotas of new cars and had made no appreciable effort to aid them in the solution of their used car problems. There was some grumbling because manufacturers had changed their policy with regard to exclusive or non-exclusive agencies without giving the dealer sufficient opportunity to arrange his business and investments in accordance with the new policy.

These items indicate that the present contracts do not fulfill the purpose thoroughly and that many important problems affecting the relations of the manufacturer with the dealer are not considered in the contract as it is determined at present. It is probable that many of them will be outside the limits of the written contract at all times. For this reason it is all important that the manufacturer should understand the position of the retailer very thoroughly so that the contract may express the spirit of the understanding and the other problems of importance be solved in accordance with that spirit.

IT is to the manufacturer's interest to foster a stable, intelligent and thorough dealer organization in the field. It is up to him to study and understand the dealer's situation better than the dealer himself, because his future is involved in the stability and the business conduct of a number of dealers, whereas the individual is concerned only with his own conditions.

It is necessary to appreciate thoroughly the fact that retailing automobiles calls for the development of business functions that were not previously a part of the operations of the retailer. Generally speaking, it has been the business of the retailer at all times, in all other lines of industry, to get people to his store, provide a good selection of commodities and to sell them at a reasonable price, to deliver commodities in the locality which he serves and to undertake these matters promptly and effectively. The retailing of the automobile includes not merely bringing people to the store, but going out of the store to them. It means not merely selling the car, but providing the right kind of service, looking after the running of the car to some extent and the character of the service and providing the supplies and accessories that go with the car. Some of these are new functions of retailing which have grown up pretty rapidly. They are not yet developed into a stable system and the understanding between manufacturers and dealers is not as thorough as it should be. The dealer has not been cognizant of all his responsibilities to his customers and his manufacturer, and the manufacturer has not fully recognized either the difficulties of the dealer or his obligations to him.

The tendency in the business of retailing automobiles is for the automobile itself to be changed more and more by the character of the local service rendered by the dealer, and the reputation of the automobile itself is intimately involved in the character of this service. On this account it is not sufficient for the manufacturer to select dealers from among the present dealer population, but it is necessary for the manufacturer, individually, and the manufacturers as a whole to give freely of their information, understanding and co-operation to the dealers, so that there will be a constant improvement in the character of the service rendered by the dealers and their ability to conduct their business along sound lines.

Whatever the form of contract entered into between the manufacturer and the distributor or the dealer, that contract must provide an equitable arrangement for both parties covering the ordinary contingencies of the business. The provisions of a contract should call for, among other items:

First—A settlement of the allotment to the dealer in reasonable accord with the possibilities of his market and the rearrangement of that quota under proper requirements to safeguard the dealer without injuring the manufacturer.

Second—It should include simple consideration of the elements of service to be provided by the dealer and the standards upon which such service could be arranged.

Third—It should recognize the dealer's position in case the agency is taken away from him and the manufacturer's rights in case the dealer desires to change from one car to another.

Fourth—It should include a consideration of the manufacturer's position in a used car problem and an equitable method of considering this under given conditions of sale.

It is obvious that a full and simple consideration of these matters will depend upon a pretty thorough understanding between the manufacturer and the dealer, and that such understanding will require a good deal of preliminary work so that the matters are fully determined before contracts are made.

These four items, however, represent the important elements in the stability of a manufacturer's market in any locality. In other words, the number of cars to be sold and the conditions of the sale, the service to be rendered on the cars that are running, the termination of the contract and the conditions involved, plus the character of allowances to be made for used cars, represent the fundamental elements upon which the manufacturer's market depends, and those elements are so intimately connected with the future market of his car that they should be the subject of full understanding and agreement.

DUTIES on automobiles and engines imported into Czecho-Slovakia have been changed by a law which recently went into effect. Under the new law chassis, with or without bodies, separately imported, are required to pay a duty of 65 per cent ad valorem. Engines for either automobiles or airplanes, separately transported, are taxed the following per 100 kilograms:

	Szecho-Slovak kronen
a—Engines for airplanes	15,000
b—Other engines—	
Piece-weight up to 50 kilograms	6,000
Piece-weight from 50 up to 250 kilograms	5,500
Piece-weight from 250 up to 500 kilograms	5,000
Piece-weight more than 500 kilograms	4,500

In addition to these duties a luxury tax of 12 per cent ad valorem has been placed upon all passenger cars and motorcycles and their parts and accessories. This tax must be paid by the importer, however. Motor trucks and ambulances are exempt from this tax.

AUTOMOTIVE INDUSTRIES
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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

World Registrations

THE possibility of business men utilizing more fully government information sources has been emphasized on numerous occasions. The success of the recent census of world automobile registration made by AUTOMOTIVE INDUSTRIES brings this point again into prominence. The consular service of the United States was responsible to a considerable degree for the success of that survey, reports being obtained on many obscure parts of the world with a promptness and accuracy that was extremely gratifying.

In a number of cases, of course, it was necessary to go to other sources for the information desired, and the very hearty co-operation extended both by individuals and organizations of various kinds throughout the world indicates the importance which motor transportation has assumed in every nation.

We are glad to take this opportunity to express our very hearty appreciation of the aid rendered by U. S. consuls, by the Automotive Division of the Bureau of Foreign and Domestic Commerce, and to the many individuals and organizations both here and abroad which have combined to make possible the very comprehensive survey of world motor vehicle registrations published in the recent Statistical Number of AUTOMOTIVE INDUSTRIES.

The Year-Around Chassis

WE have heard a great deal about the car for use the whole year through and have nothing but commendation for efforts to develop body types which are equally comfortable in all kinds of weather. It is certainly not less important to develop a chassis which is just as convenient to use in cold as in warm weather, yet far less attention is being given this matter.

It is, however, a matter of common knowledge that a considerable percentage of passenger cars are laid up for the winter months, largely because of the fact they are far less convenient to use in cold weather. One of the chief difficulties in this connection is the cooling system and there are few who will not concede the advantages of the air-cooled engine in weather sufficiently cold to make trouble for the water-cooled type. Appreciation of this situation is, in fact, very largely responsible for the expenditure of vast sums in development work now proceeding on several air-cooled cars.

Water cooling is by no means likely to lose its virtual monopoly of the field in the near future, but it is well worth while for the many advocates of this type to consider wherein it too can be so improved as to be the source of less annoyance to the user. The first item to be considered in this connection is the development of the best possible non-freezing solutions. At first thought this may seem to be a problem with which the car manufacturer should not concern himself, but he can and should at least give encouragement to its solution, for it is generally agreed that a wholly satisfactory non-freezing solution is not now generally available. The Bureau of Standards has done considerable work in this connection, and has reached the following conclusions:

1—Calcium-chloride compounds should be used with caution, if at all, on account of their corrosive action.
2—Kerosene or similar oils should not be used on account of their inflammability, high boiling point, and effect on rubber.
3—Solutions of alcohol, or alcohol and glycerine with water, can be used, but have certain disadvantages in respect to cost and need for replacement of the alcohol content as the latter evaporates. (If wood alcohol is used care must be exercised to see that it is free from acid).

More research should be conducted with a view to finding if possible less expensive, more easily procured, and generally more satisfactory non-freezing solutions, and car makers will help themselves by giving substantial encouragement to work along this line. The Bureau of Standards should be asked to continue its work and ample funds be provided for pushing it to the earliest possible conclusion. When the desired result is obtained, it should be given wide publicity by all interested in promoting the most general use of automotive vehicles.

Means for easier starting in cold weather should also be considered. Many troubles result from the

failure of cars to start promptly when cranked. Among them are battery failures and dilution of the lubricating oil by fuel with their consequent troubles, annoyance and expense.

Every manufacturer of water-cooled cars and trucks should interest himself in matters of this kind, for in so doing he will increase the satisfaction of the user, and the satisfied user is the best customer as well as the best booster of any product.

The Industry Investigates

THE searching analysis which is being directed toward distribution systems is perhaps the outstanding development of the automotive industry during the last few months. The first reaction to industrial depression over a year ago was to increase efforts along the marketing lines which had always been pursued. This was followed by the necessity for reduced costs, which came to a large extent simply in reduced activity, rather than in any change of methods or increased efficiency.

Casual conversations with men in all lines of the automotive business, however, indicate that the third period has been reached, in which the fundamental soundness of various automotive distribution systems are being questioned and in which a study of basic principles is being made with a view to rendering marketing effort more efficient and more productive without increasing its cost. The necessity for such analysis has long been apparent and the degree to which it is being carried forward is one of the most encouraging signs of the times.

Car manufacturers are examining the entire system of distributing cars; are wondering whether distributors or factory branches are the most effective; and are carefully studying, in many cases, the various data which will enable them to determine the facts of the case.

The truck industry is trying to find out the best and most efficient way to market trucks; whether in combination with passenger cars; in combination with tractors; as separate units; through distributors or factory branches, etc.

The jobber problem has assumed maximum importance in the eyes of many accessory manufacturers. Some of the accessory group think it will be necessary to have jobbers or middlemen of some kind who will act as territorial representatives for the factory; others think that many jobbers in a territory can be allowed to handle the product. Methods of parts distribution have played a prominent part, of course, in recent news of the industry.

Thus, all along the automotive line, the efficiency of distribution methods is being questioned and carefully studied. A few people are already willing to give a definite answer to most of the questions involved. Those who understand the problems most thoroughly, however, are convinced of the necessity for further investigation and study before final decisions are made.

The automotive industry is young. The necessity for a study of marketing problems has arisen only recently. The period of serious investigation and experimentation has been reached. Certain fundamentals of future action are apparent, but final solution of the problems involved will come through further analysis.

Developments in Public Transport

A NEW factor in public transportation is looming up in the moving platform. Such a system, if at all practicable, would naturally be best suited to the most congested portions of metropolitan cities. The great advantage of the system is that it obviates congestion, as passengers can enter and leave at any point along the line, and at any time, the platform is moving continuously without stop. They are, in fact, very similar to the escalators installed at the main elevated and subway stations in New York.

Shortly after the war the Department of the Seine, which comprises the city of Paris and its suburbs, took over the transportation system of the district, which had been unprofitable for a long time and had depreciated greatly during the war. Since then various plans for reorganizing the system have been considered, especially with respect to relieving congestion at various junctions, and serious consideration is being given to the proposal of a moving platform system for the most crowded sections of the city. This system is not entirely new to Parisians, having been in use on the Champ de Mars during the World's Fair of 1900. As there constructed, the system consisted of three moving platforms side by side of successively increasing speeds. The passenger would step from a stationary platform or walk at one side of the moving system, to the lowest speed platform, the speed of which was so low that it could be entered upon without any risk. In a similar way he would pass from the first to the second platform and from the second to the third. Of course, even the speed of this third platform was comparatively low, but when it is considered that there is no waiting for cars and that the distances covered by such a system is short in any case, it will be agreed that a speed of perhaps 9 or 10 m.p.h. is within the limits of practicability. At the World's Fair the platforms were erected on an elevated structure, offering a fine panoramic view.

In order to obtain designs (or at least ideas) for such an installation the Prefect of the Department of the Seine has written out a prize contest covering the "development of a mechanical system with continuous delivery adapted to public passenger transport." A first prize of 100,000 francs and two other prizes are offered for the best designs. Foreigners and syndicates comprising even a single foreign member must obtain special permission if they wish to compete.

The development here considered is of some interest to the automotive industry in that the adoption of transportation by moving platforms would cut into the field now served by the motor bus. It is obvious, however, that the system has any chance only in sections where there is heavy traffic practically all day long and therefore would be confined to limited areas, so that it could not greatly detract from the business of the motor bus and street car.

Durant to Build for Parts Makers

Plan Calls for New Low Priced Car to Compete with Ford

That Is Understood to Be Basis of Cryptic Contract Announcement

NEW YORK, Feb. 21—There has been much speculation within the industry for the past week concerning the exact meaning of the announcement made last week that "W. C. Durant, president of Durant Motors, Inc., has accepted a contract to build in quantities a 4-cylinder 5-passenger automobile to retail at $348."

Fuel Economy Feature

While Durant headquarters steadfastly adheres to its determination not to elucidate this somewhat cryptic statement until March 9, there is reason to believe that when the explanation is made it will constitute a somewhat sensational chapter in the development of the industry.

When the facts are made known, according to the best information available, they will disclose that a group of prominent parts manufacturers have banded together to enter the automobile building field with an assembled car that will compete with Ford.

It is from these parts makers, if this information is correct, that Durant has accepted the contract to produce in quantities a car with electric starter and demountable rims that will undersell Ford. The chief talking point of this car will be fuel economy. Tests are said to have shown it will make many more miles per gallon of gasoline than will a Ford.

Details of the plan of operation are purely speculative. The terms of the contract are not known. It is assumed the merchandising as well as the assembling will be left to Durant. Neither is there any information as to where it will be put together, but it is asserted that a production of 1000 a year will return a profit.

Identified with Servicing Group

Specifications have not been disclosed, but it will be powered with a Continental engine, it will have Timken axles, and the electrical equipment will be Electric Auto-Lite.

The presumption is that the companies which have signed the contract with Durant are the same which recently announced the establishment of a chain of service stations throughout the country. This group included Continental Motors Corp., Timken-Detroit Axle Co., Brown-Lipe Gear Co., Borg & Beck Co. and Spicer Mfg. Co.

While the tremendous demand for such a car as has been developed in the Durant experimental laboratories at Long Island City would assure a heavy demand for parts in its assembly, this is only a part of the story.

If a car can be produced which will compete successfully with Ford, and that is the entire purpose of the plan, there will be a large and steadily increasing demand for replacement parts. This demand would be filled through the chain of service stations which this group of manufacturers is establishing.

Henry Ford has been quoted as saying that he could afford to give his car away if he could get the parts replacement business. While this statement is exaggerated, it is based on truth.

May Build Truck Also

With this fact in mind, the men who will provide the unit parts for the new car are said to feel that they can afford to supply them at a price which will make possible a profit with sales made at retail at $348.

It is understood a similar announcement may be expected in the near future in regard to a truck and light delivery wagon which are being developed at Flint by a widely known engineer and designer. This line, it is said, will combine mechanical merit with low price.

When the new Durant enterprise is launched some interesting announcements are expected in relation to additions to the personnel of his organization.

Franklin Not Considering Willys Elizabeth Plant

SYRACUSE, Feb. 21—Reports that the H. H. Franklin Manufacturing Co. is considering the purchase of the Elizabeth, N. J., plant of the Willys Corp. from the receivers are authoritatively denied. An inspection of the property was made by H. H. Franklin at the request of the receivers.

As a result of this inspection it has been said that the Franklin company might buy the Elizabeth factory to manufacture its four cylinder air-cooled car. The company already has begun preparations for the erection of a plant for this purpose near East Syracuse.

NEW COTTA CORP. FORMED

ROCKFORD, ILL., Feb. 20—The Cotta Transmission Corp, reorganized, has been granted a charter showing capital stock of $750,000. B. W. Maguire holds $90,000 stock; T. E. Swords, $60,000, and John H. Camlin, Frank G. Hogland, Charles Shanhouse, A. C. Woods, C. E. Woodward and Stanton A. Hyer, each $35,000.

Dealers Stock Cars As Optimism Grows

Greater Confidence in Fair Spring Business Evident—Shows Reflect Feeling

By JAMES DALTON

NEW YORK, Feb. 21.—Some improvement in actual sales at retail has been apparent in February as compared with January. Most of the undeniable betterment in tone has been based, however, on the increased confidence of dealers generally in a fair spring business, beginning the latter part of March. This confidence is reflected in the stocking of cars. This is true, especially, in agricultural districts where none have been carried in some dealer showrooms for months.

Cotton Belt Outlook Better

Another indication of the greater optimism of dealers has been found in the large numbers who have attended shows this year, particularly in Kansas City. At the show there last year dealers in the outlying districts were so discouraged over the outlook that they did not think it worth while to attend. This year the dealer attendance numbered between 800 and 1000.

Companies which are watching conditions in the South found comfort in the fact that retail sales at the Atlanta show ran materially ahead of last year. In fact, the outlook throughout the cotton belt is more cheerful.

While sales of passenger cars thus far this year have not been large enough to cause wild enthusiasm, they have been so much better than they were for the same period last year that the prediction of a considerably better business for the first quarter of 1921 already is vindicated.

Truck Market Improves

The tone of the truck market continues to improve. Reports not only from rural but from industrial centers state that there is a considerable demand for light delivery vehicles. Aggregate sales of this type of truck this year will be large.

Business of parts and accessory makers, which has been materially better since the turn of the year, is

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Optimism Pervades Detroit District

Follows Dull Season Time of Speculation

While Few Factories Work Full Time, They Are Pressed by Demands

DETROIT, Feb. 20—There is a general air of optimism in the ranks of Detroit automobile manufacturers which is refreshing after the several months of morbid speculation between the closing of the active buying season last November and the opening of the 1922 shows.

Few of the factories are working full time yet, but they are hard pressed to meet the demand for cars in the part time weeks now in force. By March 1, practically all should be on a five and half day weekly basis, this being especially true in the cars retailing in the $800 to $1,000 class.

Cadillac and **Lincoln** both claim orders far ahead, and the former is on full time. Lincoln is on full time but with a small force pending determination of permanent operating methods. Releases on materials for Lincoln cars have been advanced one month, and releases by many other manufacturers are being made ahead of time. There is a gradual opening up in the tool equipment end of the business, manufacturers seeming to be preparing for the heavy production months about to open and finding much of the former equipment requiring replenishing.

Dodge Brothers are known to be starting the laying out of the factory for the manufacture of a new model which will sell at the same price as the present car, but will be a lower built car with sharp, streamline effects. The new car will probably be ready for the early summer market, coincidentally with the new bodies which will be built at the factory for the first time.

Reo Motor Co. has presented figures which show that 1000 more speed wagons were sold in January than were shipped from the factory, indicating that not only are dealer stocks undergoing rapid depletion, but that buyers of commercial cars are coming into the market, and, therefore, that general business is improving strongly.

King Motor Car Co., of which little has been heard since the receivership, has announced a schedule of 2000 cars for the year. This will be almost five times the number manufactured last year. King prospects are considered bright, many new dealers having been added to the organization in the past few months and finances are in good shape.

Kess-Line Motors, which announced a new eight cylinder car some months ago, is now about to go into production. The list price of the touring has been fixed at $2,250. The feature of the new car is the engine which has eight small cylinders cast in bloc, which is claimed to develop 100 horsepower.

Gray Motors will make its first shipments in April, according to Frank L. Klingensmith, president. The price of the car is still unrevealed. There is a report that contracts for equipment are about all closed and that the price will be forthcoming shortly.

Page Elected President of New American Motors

PLAINFIELD, N. J., Feb. 20—Carl L. Page will head the reorganized American Motors Corp., which has taken over the assets of the original company, recently acquired from the receivers by a syndicate of stockholders. At a meeting of the board of directors Page was elected president of the new company and will assume active charge of the plant immediately with headquarters at the plant here.

Although he has been identified with the younger element in the automobile industry, Page is a veteran in service, having begun his career more than 20 years ago with the White Motor Car Co. of Cleveland, which appointed him manager of the New York branch while he was still a young man. Subsequently he became the head of his own organization as distributor for the Chalmers and Mitchell cars. Later he acted for Jordan and more recently undertook a factory connection with the Saxon Motor Car Co., where he served as vice-president in charge of sales.

Operations have been resumed at the plant here with enough orders ahead, it is reported, to warrant a production of 100 cars a month for some time to come.

G. M. May Handle Trade in Europe Through London

NEW YORK, Feb. 21—The volume of business which now is being received by the General Motors Export Corp. is highly gratifying and indicates steady improvement of conditions in the foreign field. Without the expenditure of large sums in sales efforts, the export orders now being received at Oshawa, Ontario, for Buicks and Chevrolets are averaging 125 a day.

Little effort is being exerted to make sales on the Continent and the company may decide in the near future to handle that business through London until there is a material improvement in conditions.

Chrysler Gives All His Time to Maxwell

Condition Likely to Be Only Temporary—No Definite Plans Announced

NEW YORK, Feb. 21—Walter P. Chrysler whose resignation as a director and executive, vice-president of the Willys-Overland Co. was announced last week, said to-day that he had no announcement to make at this time concerning his plans for the future except that for the present he would devote all his time to the Maxwell Motor Corp. of which he is chairman of the board. It is not believed, however, that this situation will continue permanently.

It is known that Chrysler has several projects and propositions under consideration but he has not determined what one to take up. Since his resignation became known, the industry has been filled with rumors about impending announcements of his affiliation with one company and another. The most popular of these has been that he would join the General Motors Corp. It can be stated, however, that no such connection is imminent.

Another favorite report is that Chrysler will head a company which will be organized and backed by banking interests to take over the Elizabeth plant of the Willys Corp. and build there the Chrysler six which was ready for production when receivership proceedings were instituted. It also can be stated that there appears to be little basis for this report and the chances are that the Elizabeth factory will be sold to some manufacturer already in the field.

Chrysler will leave in a few days for a long rest at Palm Beach.

Illinois Body Company Creditors Name Committee

DANVILLE, ILL., Feb. 21—Creditors of the United Automotive Body Co., which has a plant at Tilton, have appointed a committee to inspect the plant and prepare a report recommending a course of action. The parent company of the United Automotive Body Co. known as the L. C. Graves Corp. of Springboro, Pa., was forced into a receivership three weeks ago by the failure of a bank in which L. C. Graves was interested.

The liabilities of the United Automotive Body Co. are estimated at $41,000, while the assets include the plant, materials and bodies under construction. The original plan of the L. C. Graves Corp. was to operate forty branches in various states.

Machine Patent Suit Lost by Seiberling

New Jersey Defendant May Start Infringement Proceedings Against Tire Makers

AKRON, Feb. 20—F. A. Seiberling, inventor of the first tire building machinery and now president of the Seiberling Rubber Co., has lost his patent infringement suit in the United States District Court of New Jersey against the John E. Thropp & Sons Co. of Trenton. N. J. The Thropp company manufactures tire building machinery for about 60 tire companies in the United States.

Considerable significance is attached to the outcome of the Seiberling suit, as it is understood that the Thropp company, unless Seiberling appeals, may possibly institute infringement proceedings against Seiberling and numerous other tire manufacturing companies, on the ground that their patents, which Seiberling claimed constituted infringements upon his, antedate Seiberling patents and all others on the specific tire building machinery involved.

Brought on Cotton Spinner

Seiberling brought his suit on claims of infringement on two of his patents on machines designed to spin the cotton fabric into the tire carcass by use of spools and high speed cores. Prior to the final argument in the case Seiberling withdrew his infringement claim on the earlier of his two patents involved. A disclaimer filed sought to read into the latter patent the particular process of tire building in dispute.

The district court of New Jersey in its decision decrees that the latter patent as modified by the disclaimer is invalid on the ground that the process or method specified in the disclaimer was nothing more than had formerly been followed by hand in tire construction. The Seiberling suit is similar to that filed by Seiberling over a year ago against the Firestone Tire & Rubber Co., of Akron, and which the latter won in the appellate court at Cincinnati, O.

The New Jersey court's decision in the Seiberling vs. Thropp case is:

This case involves letters patent 941,962 for a tire making machine, granted, Nov. 30, 1909, upon the application of Will G. State (Chief engineer at Goodyear under the Seiberling regime), his interest assigned to the plaintiff. The bill also claims an infringement of patent 762,561 granted on the application of Messrs. Seiberling and Stevens. This patent has been withdrawn and a decree is asked under the State patent alone.

Process Used Before

The plaintiff's patent was before the Circuit Court of Appeals for the Sixth Circuit in the case of the Firestone Tire & Rubber Co. vs. Seiberling, 257 Fed. Reporter, 74. The claim is urged however that the record in the present case is so distinct from the record in that case that a different result is inevitable, the distinction being that a disclaimer having been filed Feb. 14, 1919, claims 1, 2, 3, 18, 19, 20 and 21 are not in the suit and claims 8, 9, 10, 11, 14, 15, 16 and 17 have been erased. The effect of the disclaimer is broadly to limit the patent to a combination in a tire making machine of a forming or spinning roll with a high speed core. The method or process used is the same which the proofs have showed had for many years prior to the patent been used in the making of tires by hand.

The Circuit Court of Appeals for the Sixth Circuit considered the case as though before them in its present aspect. If further authority is necessary see Conroy vs. Penn Electrical & Manufacturing Company, 155 Fed, 421, affirmed 159 Fed., 943. The result reached makes it unnessary to pursue the the many other grounds urged for the invalidity of the patent.

The relief sought will be denied.

Industry Pays Huge Tax on Its Income

WASHINGTON, Feb. 20—Analysis of corporation returns by the Bureau of Internal Revenue shows that of 302 corporations engaged in the manufacture of motor vehicles, airplanes and spare parts, 285 reported a net income aggregating $233,814,078 during the calendar year of 1919. On this sum they paid an income tax of $17,875,652 and a war profits and excess profits tax of $56,172,491, making the total taxes paid $74,048,143.

Seventeen corporations reported a deficit aggregating $328,213. Under the classification of cab, livery, jitney-buses, automobile cartage, etc., 2271 corporations filed tax returns amounting to $2,031,169 on a net income of $11,247,571. The income taxes amounted to $657,258 and war profits and excess profits taxes amounted to $1,373,911.

A. E. A. Plans to Take Up Service Question

CHICAGO, Feb. 20—The merchandising department of the Automotive Equipment Association, under the direction of Ray W. Sherman, which has been waging a nationwide "Ask 'Em to Buy" campaign for several months, is ready to broaden its activities and include the service stations of the country in its educational work.

The new work will carry the campaign for better sales into the back end of the shop, where it will seek to better service. Equipment, operations and everything that will better the service to the owner is to be included. The same earnest effort that has gone to better the retailing of accessories will now include the mechanic and the service he has for sale.

DAWSON MAY CONTINUE GARY

GARY, IND., Feb. 20—Property and assets of the bankrupt Gary Motor Truck Co., with assets of $407,846 and with liabilities equalling or surpassing that sum, will be sold to the highest bidder at public sale Feb. 24. It is believed that Frank Dawson, president of the company, will head an organization to purchase the property and to continue under the old management.

Bureau Co-ordinates Anti-Theft Efforts

Interstate Commission Organized in Chicago for All Law Enforcement Bodies

CHICAGO, Feb. 20.—Organized to give service and effect co-operation and not to sell service, the Interstate Motor Theft Commission, chartered under the laws of Illinois, has established headquarters in Chicago, where it hopes to furnish a national clearance test to be applied to all cars registered in the United States as a means of co-ordinating the efforts of police departments, insurance companies and others, in reducing the theft of automobiles, recovering stolen cars and prosecuting the thieves.

The commission, which is fashioned somewhat after the style of the Chicago Crime Commission, is governed by a board of seven, assisted by national advisory boards composed of police officials, insurance men and business executives. Joseph A. Farout, deputy police commissioner of New York; Charles W. Peters, sheriff of Cook county, Ill.; Dan Beard, national Boy Scout commissioner; J. A. Hall, educational director of the Associated Advertising Clubs of the World; Gutzon Borglum, president of the International Sporting Club; E. M. Allen, member of the insurance committee of the United States Chamber of Commerce, and Harvey G. Badgerow, president of the Illinois Insurance Federation, are members of the advisory committee.

Fees Will Support Commission

The commission will endeavor to keep itself going through fees from memberships. Any service that may be rendered any member is wholly secondary to the main issue, which is to establish a national clearance bureau for the free use of law enforcement bodies. Co-operation is asked from all kindred organizations and every effort will be made to aid in destroying the stolen car market.

This organization was decided upon after a year's study of the situation and conferences with leading police officials, insurance representatives and business heads closely associated with the automotive industry.

Champion Ignition Co. Now A. C. Spark Plug

FLINT, MICH., Feb. 20—The Champion Ignition Co., manufacturers of the A. C. spark plug, will be known as the "A. C. Spark Plug Co." after April 1, according to an announcement made by B. DeGuichard, vice-president and general manager of the company.

The reason for changing the name is to bring a closer tie-up between the company's name and the nationally known trade name, "A. C.," with which the firm's advertising is labeled, as is the spark plug itself.

Goodrich 1921 Loss Reached $8,983,401

Assets Reduced to $89,031,229—Inventories Suffer Big Downward Revision

AKRON, Feb. 20—Assets of the B. F. Goodrich Co. were reduced from $138,910,112 in 1920 to $89,031,229 at the close of the past fiscal year on Dec. 31, 1921, according to the company's annual audit and balance sheet. Assets in 1919 were listed at $175,715,000.

The company's inventory has been brought down from $54,184,000 in 1919 and $72,631,142 in 1920, to $29,618,938, while the surplus has been reduced from $22,706,499 in 1920 to $10,194,527. The loss sustained by the company in 1921, of $8,983,401, carried to surplus account, is responsible largely for the heavy surplus shrinkage. In addition 7 per cent preferred stock dividends of $2,626,470 and one common stock dividend of $1.50 per share, totaling $902,100, were paid out of the surplus. The Goodrich surplus in 1920 was listed at $41,203,046.

Falling Off in Sales

Sales for the year approximated $87,000,000, as compared to $150,000,000 in 1920 and $141,000,000 in 1919. Practically the entire loss, officials state, is due to the decline in the 1921 market values of raw materials and finished goods carried forward from the previous year.

The balance sheet shows Goodrich plant investments of $32,115,758 as compared to only $19,486,065 in 1919. Assets include investments of $4,446,545; treasury stock certificates of $230,600; accounts receivable of $19,307,518; Liberty bonds of $43,266 and cash of $2,572,696. The tangible capital assets of $32,115,758 which include plants, real estate, equipment, etc., are listed less a reserve of $10,032,494 for depreciation and obsolescence. Deferred charges to future operations total $593,906.

Current liabilities include accounts payable and sundry accrued liabilities of $3,413,128; Five year 7 per cent gold notes due April 1, 1925, of $30,000,000; seven per cent preferred outstanding stock of $37,224,000; reserves and other contingencies of $4,123,547; and employees credits on stock subscriptions, of $526,862.

U. S. Sales Drop 35.79 Per Cent

NEW YORK, Feb. 20—The United States Rubber Co., in its annual report for the year ended Dec. 31, 1921, shows net sales of $164,470,368, a decrease of $91,679,762, or 35.79 per cent as compared with the previous year.

After absorbing approximately $10,000,000, representing the excess cost of finished goods carried over from 1920 and sold in 1921 as compared with the average cost of producing similar goods in 1921, but before adjustment of inventories, all of which adjustment is definitely allocated to 1920, the net profits for the year amounted to $470,817 after all interest and other current charges. This showing was made notwithstanding a reduction of approximately $18,000,000 in the income from sales caused by the price reductions made after Jan. 1, 1921.

In 1920 the company, before adjustment of inventory, reported net income of $21,220,983. Adjustment of inventories in both years was charged to profit and loss surplus with the result that this item was reduced from $47,325,380 at the close of 1920 to $30,031,633 at the close of 1921.

The general balance sheet as of Dec. 31, 1921, shows net current assets of $134,766,062, of which $13,816,477 was in the form of cash, $41,543,883 in accounts and bills receivable, $51,248,659 in finished goods and $25,443,118 in materials and supplies. Current liabilities aggregated $49,232,561, of which $36,210,000 were in the form of notes payable.

Kelly-Springfield Loses $506,960

NEW YORK, Feb. 20—A substantial loss in the last year was sustained by the Kelly-Springfield Tire Co., according to the annual income account for the year ended Dec. 31, 1921. After all charges the company had a loss of $506,960, whereas in the preceding year there was a net profit of $1,959,294, before taxes but after all other charges.

The company's balance sheet as of Dec. 31 shows total current assets of $10,775,715, against which are current liabilities of $863,595. Cash on hand totaled $2,357,977 and inventories were carried at $5,525,739. Current liabilities consisted almost entirely of accruals of interest, dividends and balances due customers, with only $332,576 in trade accounts payable.

In his annual statement to the stockholders, President Alfred B. Jones reported that although the value of sales declined in the year by reason of price reductions, there was an increase of more than 20 per cent in the volume of units sold. Extraordinary charges were due to the decline in the market value of materials and to expenses incident to the operation of the new plant at Cumberland, Md., all of which has been charged directly against the year's operations.

Ford Denies Seeking More Motor Plants

DETROIT, Feb. 2—Henry Ford asserts there is "absolutely not a word of truth" in the reports that he is negotiating for the purchase of the C. H. Wills & Co. or any other motor car plant.

An official of the Dodge Brothers Motor Car Co. asserts that sale of the plant to Ford or any other interest is not contemplated.

A dispatch from Buffalo quotes M. E. Forbes, vice-president and general manager of the Pierce-Arrow Motor Car Co., as saying that there is no foundation for the report that Ford is buying control of that company.

SIGNS LAMPERT BILL

WASHINGTON, Feb. 18—President Harding to-day signed the Lampert patent office bill, increasing salaries of patent office employees and expanding the force there in order to relieve the congestion of work.

Cleveland Getting More Parts Orders

Better Business Comes With Turn of Year—Continued Gains Expected

CLEVELAND, Feb. 20—Buying started by the automobile show has brought many orders to parts and accessory manufacturers here. There was a spurt in orders just after the opening of the year, and business has continued since on the level then established. Manufacturers are strong in the belief that further gains may be expected within the next two or three weeks.

Makers of parts and accessories say that never within their history has buying been done so closely by automobile makers. Orders placed carry provisions for speed in delivery. Steel makers in this district have had the same experience. Four-fifths of the orders for steel are for rush delivery, but steel makers assert that the automobile industry is doing more than any other single line to put back the fires in the steel mills.

Orders have been much better in January and February than in several preceding months, but they are not normal, according to executives at the plant of the Willard Storage Battery Co. At this plant they are looking for a general increase up to the middle of June. Other statements follow:

Grant-Lees Gear Co.—Planning to work on capacity basis on orders that are sufficient to keep the company going the entire year.

Sherwin-Williams Co.—(Paints)—The business in the automobile parts department is better than in any other branch. The volume is better than it was at the same time a year ago.

Columbia Axle Co.—There has not been much change in this factory since about Jan. 10 when orders picked up. Steady improvement expected until the middle of June.

Interstate Foundry Co.—This factory is now working six days a week instead of five days as was the case two weeks ago. Before that the men were employed only three days a week. The outlook is good for the men to continue on the six days a week schedule.

National Acme Manufacturing Co.—There has been a considerable improvement in the demand for automatic machines. Outlook is good for continued up turn.

K-W Ignition Co.—The demand is better than it was two weeks ago and a gradual increase is expected until June. Jobbers' stocks are low.

Ohio Body-Blower Co.—The automobile business is now taking about 25 per cent of the plant's total, compared to the usual 60 per cent.

BRAZIL BUILDING ROADS

SAO PAULO, BRAZIL, Jan. 26 (*by mail*)—The highway connecting Sao Paulo and Rio de Janeiro is being actively developed, the authorities here making every effort to complete their part of the work so that the road may be opened for the Centennial Celebration in September.

Congress May Allow Bonus Plans to Rest

Predictions Made That No Legislation Will Be Enacted at This Session

WASHINGTON, Feb. 21—Predictions are freely made in official quarters that there will be no bonus legislation enacted at the present session of Congress. It is apparent that the interminable controversy will be passed on to the next session and the legislation indefinitely postponed. At present there are indications that the House may jam the measure through at the current session purely as a matter of supposed political expediency, realizing that the Senate and the President favor postponement of action.

There is a strong element in the House, manifestly at variance with the Administration, who would like to return to their constituents at the forthcoming fall election as sponsors of a bonus, regardless of how the money should be raised.

Sales Tax Suggested

The Administration is insistent that the bill shall include a plan for obtaining the revenue and has recommended a sales tax. The Chief Executive has announced himself in favor of a production tax to be collected at the source because of its so-called simplicity of collection and equitable distribution. The agitation for a retail tax apparently has not impressed the President, for he has expressed the belief that it would be too complicated and would involve more expense in collection than a manufacturer's tax.

The President refrained from suggesting the rate which could be levied at the source, but it is said that he would approve a 1 per cent tax on wholesale sales of manufacturers' products. It is estimated that approximately $350,000,000 could be obtained annually from this source, and this would be sufficient to meet the demands of a cash bonus plan.

The agricultural bloc in Congress is strongly opposed to the sales tax plan. It is supported in this view by the American Federation of Labor. Business interests of the country, as Congress is well aware, are opposed to any kind of bonus legislation because of its serious economic effects.

Harding Opposes Excess Profits

The President is unalterably opposed to the restoration of the excess profits tax, which proved so burdensome to business and industry. It is generally conceded that a levy on manufacturers' products could not be added to prices paid by ultimate consumers. Business men feel that it is not feasible to raise prices at this time. They also realize that they are the first to feel the effects of extra pressure from taxation in diminution of profits and would undoubtedly be compelled to absorb this assessment through narrowing of the margin of profits. Judging from the volume of protests received by Congress from business interests, it is evident they are convinced that the study of the economic effects of a bonus by the legislators is exceedingly superficial and that the political side only has been considered.

President Samuel Gompers of the American Federation of Labor, in a statement to Congress, declared that organized labor favors a bonus, but "recognizes in the proposal to attach the sales tax to the soldiers' adjusted compensation bill a subterfuge intended either to defeat the bonus or to create a feeling of resentment against the veterans of the World War by placing the burden upon those least able to bear it and by permitting the escape of those who profiteered so relentlessly during the period of the war and since the war."

The farm bloc has refused to be placated in its opposition to a sales tax and is marshalling its forces in favor of an excess profits tax, and there is talk of it being joined in its campaign by organized labor. Even in the event of such legislation passing Congress through the activities of these groups, the President undoubtedly would veto it, and it is not at all probable that the veto could be overridden.

Denby Sees Indications of Greater Truck Buying

DETROIT, Feb. 20—The Denby Motor Truck Co. at its annual meeting here reported that a decided improvement in truck buying is indicated for 1922 and that it has received as many truck orders for the first six weeks of this year as came in during the first three months of 1921. The demand is especially good on the ¾-ton and the 1½-ton models. It reports sales as promising on new model 35, 2½- to 3-ton.

Despite the dull year in the industry, the company reported that it is now in a better financial position than a year ago with all inventories charged down to current replacement values.

The same management was continued in office and the following directors were elected: E. R. Ailes, treasurer, Detroit Steel Products Co.; Hon. Edwin Denby, J. Walter Drake, chairman, Hupp Motor Car Corp.; C. H. L. Flinterman, vice-president, Detroit Pressed Steel Co.; H. L. Lyster, A. S. More, president, Denby Motor Truck Co. and T. M. Simpson, assistant secretary, Continental Motors Corp.

STEWART-WARNER TAX WINNER

CHICAGO, Feb. 20—Stewart-Warner Speedometer Corp. has made a settlement with the government in an income tax controversy that has been pending for several years, by which the company is saved payment of $2,000,000. The tax question involved the amount of exemptions carried by the item on patents and good will and the classification in earnings paid each year to the Stewart interests.

Court Finds Kelley Tire Offer Too Low

Newman Group Bid $200,000 for Plant—Receivers Aim to Get at Least $100,000 More

NEW HAVEN, CONN., Feb. 18—The reorganization proposition of the A. Newman group of New York City to take over the plant of the bankrupt Kelley Tire & Rubber Co., in West Haven for $200,000, that amount being $50,000 less than their first offer, is rejected by Judge George E. Hinman in a decision handed down this week in the civil side of the superior court here. The decision denies the application of the stockholders' protective committee to sell.

Some time ago, the receivers, Attorney Albert H. Barclay of this city and the First National Bank of Bridgeport, opened negotiations with the Newman group of financiers relative to the sale of the plant. The first offer was for $250,000, it being estimated that this would leave $200,000 for the creditors and stockholders, $50,000 being needed to pay litigation and receivership. The time limit expired without acceptance, and thereupon Newman made a new offer of $200,000, good until Feb. 17. The offer was commended by the stockholders' committee, but objected to by the receivers, who desire to see if they cannot get at least $300,000.

The decision of Judge Hinman says: "While it is probable that, considering the interests of the stockholders alone, the benefits accruing to them under the Newman offer, though small, is as much or more than can be reasonably expected from a sale for cash without concessions in stock to the stockholders contemplated by such offer, the duty of the court and its representatives, the receivers, is to obtain as large a price as possible, in order to provide funds toward satisfaction of the claims allowed."

G. M. C. SELLING HOUSES

FLINT, MICH., Feb. 20—A sweeping price reduction aggregating more than $1,000,000 on houses of the Modern Housing Corp. is announced by General Motors Corp. through H. H. Bassett, president of the company which built 950 homes in Civic Park and Chevrolet Park. The price slash will place the sale price of a modern five-room stucco house on a paved street at $4,000. Six-room houses may be had from $4,500 to $5,000, with larger homes proportionately higher in price.

ORDERS SALE OF TEXAS MOTORS

FORT WORTH, Feb. 20—Judge R. E. L. Roy in the United States District Court has authorized a receiver's sale of the assets of the Texas Motor Car Association. Bids will be received not later than March 13 and will be opened at the court house in this city the following day.

Mason Incorporates New Truck Company

Will Make 1-Ton Model at Flint —Is Capitalized at $500,000

FLINT, MICH., Feb. 21—The Mason Motor Truck Co., headed by Arthur C. Mason as president and general manager, has been incorporated in Michigan with a capital of $500,000. The secretary of the company is Melvin C. Day, who has been closely associated with Mason for eighteen years, and the treasurer is A. G. Bishop, a vice-president of the General Motors Corp. The new company will manufacture in Flint a 1-ton truck to be known as the Mason Road King.

While the complete specifications are withheld, it is known the truck will be powered with a Continental engine and will have Timken axles. It will sell around $1,000. The plant, which has been purchased in the south end of Flint, has a capacity of 40 a day, and the company expects to be running at capacity by midsummer.

The new corporation is completely financed and no stock is on the market.

Mason built the first motor used in the first Buick car, and was the first man on the Buick payroll. He developed and built motors now running in the Chevrolet F B and 490 lines.

He organized in 1911 the Mason Motor Co., of which he was president and general manager. This company manufactured Chevrolet motors until 1915, when it was taken into the Chevrolet company. Mason then became a consulting engineer for the General Motors Corp. and developed for it the Samson tractor. He continued with the corporation until December, 1920, when he came to Flint and took over the plant where he has developed the new truck.

Employment 135.5 Per Cent Better Than January, 1921

WASHINGTON, Feb. 20—Comparison of employment in 47 identical establishments in the automotive industry reporting a payroll for a period of one week for December, 1921, and January, 1922, gives a decrease of 5.9 per cent in the number on the payroll and a decrease of 35.8 per cent in the amount of payroll for these months. Study of employment in these places for January, 1921, and January of the present year shows an increase of 135.5 per cent in the number on the payroll in January, 1922, and 45.4 per cent in the amount of the payroll. These figures and other industrial statistics were compiled by the Bureau of Labor Statistics from reports concerning the volume of employment from representative establishments in 13 manufacturing industries.

The comparison for the one week period covered in January of last year and January, 1922, shows that in January, 1921, 36,588 were on the payroll and for the same month this year, 86,166. The amount of the payrolls for one week in January, 1921, was $1,042,144, as compared with $1,515,399 for January, 1922. These identical establishments in December, 1921, had 91,682 on the payrolls and 86,282 during January, 1922. The amount of the payroll was $2,363,481 in December, 1921, and $1,518,331 in January, 1922.

A survey by the Bureau of Labor Statistics stated that a decrease of 15 per cent to all men was reported by one establishment. Two plants reported a wage rate decrease of 10 per cent, affecting the entire force in one, and 60 per cent of the force in the second. Sixty per cent of the men in one plant were cut 8 per cent in wages.

Financial Position Strong Gardner Statement Shows

ST. LOUIS, Feb. 21—The balance sheet of the Gardner Motor Co. as of Dec. 31 shows the company in a strong financial position notwithstanding the substantial loss taken during the year on inventories and increased overhead resulting from smaller production. The company has no current liabilities except dealers' deposits amounting to $23,448. Cash on hand amounts to $514,180, accounts receivable to $244,238, and inventories, at cost or market, to $519,604.

The report to stockholders states that since the price of the company's touring car was reduced to $895 sales have been greatly stimulated and many new dealers have been added.

Dealers Stock Cars As Optimism Grows

(*Continued from page* 482)

holding up well, and there are indications of continued improvement. They now are getting the full benefit of inventory deflation by vehicle manufacturers.

There is much speculation within the industry over the mysterious announcement of W. C. Durant that he had accepted a contract for quantity production of a four-cyclinder, five-passenger car to sell at $348, with electric starter and demountable rims. This price would be nearly $100 under the price of a five-passenger Ford with the same equipment. One of the questions most frequently asked is where the car will be built, for production in large quantities will be necessary if the new car is to be manufactured at a profit.

BENZ-RUMPLER MERGER

LONDON, Feb. 10 (*by mail*)—The Benz and Rumpler companies have joined hands with a view to turning out a car containing all that is best in the two companies' present types. Until the utility of the projected car is proved, Benz will continue to manufacture their own models.

Consolidating Work, G. M. to Sell 6 Plants

Former Cadillac Factory Included —Will Also Dispose of Site at Grand Rapids

DETROIT, Feb. 21—The General Motors Corp. will sell, through its real estate department, six plants formerly occupied by divisions of the corporation, as part of its plan of consolidating activities. The plants listed for sale are:

The former Cadillac plant, Detroit; the Frigidaire Corp. plant, Detroit; Michigan Crankshaft Co. plants at Lansing and Saginaw; the International Arms & Fuse Co. plant at Bloomfield, N. J., and a plant built by the Champion Ignition Co. at Brantford, Ont., which never was occupied.

A statement by the company relative to the sale says:

> In readjusting its business to conform with new plans providing for still greater efficiency in production the General Motors Corp. has found it desirable to consolidate some of its manufacturing operations. As a result of this development, six plants formerly operated by the corporation are now being placed on the market. The number is small when viewed in relation to a business consisting of seventy-eight divisions, subsidiaries and affiliated companies.
>
> The plants now being offered, subject to prior sale, are all in good condition and were operated successfully within the last year. They provide a wide range of selection with respect to location, size, character of construction and cost.
>
> To avoid holding factory property in a non-productive condition the corporation is prepared to sell any or all of the six plants at prices below carefully made appraisals.

The floor space of the plants aggregates 418,712 sq. ft.

In addition to the plant sale, the corporation will sell a factory site of 60 acres in Grand Rapids.

E. S. Hare, Inc., Announces Additions to Personnel

NEW YORK, Feb. 21—A. G. Hare, a member of Hare & Chase and a brother of Emlen S. Hare, president of E. S. Hare, Inc., has been named vice-president of the latter organization, which succeeds Hare's Motors and which will act as manufacturers' agents, sales and engineering experts. W. G. Toland, formerly general sales manager of the truck department of Hare's Motors, has been appointed secretary and treasurer and has been placed in general charge of the sales of the organization.

Frederick Miller, at one time connected with the Packard Motor Car Co., serving as its eastern district manager and later as head of Packard New York sales, becomes field representative. William Carl Chapman, who has been with the Hare organization practically since its inception, will act as advertising manager. Victor Bensch has been named to act as a member of the operating staff of the organization.

Akron Tire Output Steadily on Upgrade

Industry Above Peak of Last July —Ford Places Order with Mason

AKRON, Feb. 20—Tire production steadily is on the upgrade in Akron, although there has been no outstanding spurt. All tire companies report spring orders up to expectations, but are not planning any substantial production increases, for there is always a seasonal buying slump to follow the first spring buying spurt, and finished goods inventories are to be held at rock bottom and will not be materially expanded.

Akron, according to estimates of the rubber companies, is in better shape economically and financially than at any time since the beginning of the business depression in the early part of 1920. The tire industry itself is slightly above the peak reached in July of last year, just prior to the second precipitate slump. Actual producing wage earners in Akron's major tire plants now number in excess of 30,000, as compared to a peak employment of about 28,000 reached in July, 1921, following the drop from 71,000 employees in May, 1920, to 18,500 in December, 1920.

Miller 75 Per Cent of Normal

Goodyear within the past two weeks has added 500 men and increased production to 22,000 tires daily. Miller is operating about 75 per cent of normal, and Firestone continues its production ticket of about 20,000 tires daily. The General tire plant is running up to capacity. The Mohawk Rubber Co. officials report plans for increased production this spring.

The Seiberling Rubber Co., controlling the Portage plant at Barberton and the Lehigh tire plant at New Castle, Pa., now has a combined production of 800 casings and 1500 tubes daily. Production includes the old line of Portage cord and fabric tires and the new Seiberling cord tires on which the sidewall is eliminated and replaced by tread stock running from bead to bead.

F. A. Seiberling, president, announces his company will go extensively into the rubber heel manufacturing business this spring. H. J. Thompson, for years sole and heel sales manager for the Goodyear company, has resigned to join the Seiberling company in a similar capacity. R. H. Lyons of Goodyear has also joined Seiberling as a special heel sales representative. W. H. Oburn, for several years secretary of the old Goodyear board of control, has become manager of credits and collections for Seiberling.

Seiberling Moves Offices

All general offices of the Seiberling company have been moved from Akron to Barberton. Seiberling's new cord tire is ready for shipment for spring delivery. Officials of the company report heavy orders for the new casing.

The Mason Tire & Rubber Co. of Kent confirms reports that it has booked orders from Henry Ford for from 15,000 to 20,000 tires a month. Under present plans the Mason plant's production will be doubled and will go to 5000 casings daily on March 15. The company's annual report due next month is expected to show sales for the fiscal year of approximately $9,000,000, as compared to $7,000,000 in 1920. Net profit is estimated at $600,000. The Ford order is the first original equipment business undertaken by the Mason company.

Columbus Business Considerably Better

COLUMBUS, Feb. 20—With the coming of milder weather demand for passenger cars in Columbus and central Ohio territory is increasing. Dealers in Columbus, following the very successful show, report a larger business with prospects more easily handled. Quite a few sales of cars have been made, both for immediate delivery and for delivery in March and April. The tone of the trade shows a decided improvement in many ways. The public is coming to a realization that prices are now pretty well stabilized.

Truck business is still slow, although there are signs of improvement. The demand for light delivery wagons is the best and far in excess of that for the heavier lines of trucks.

Light Cars and Cycles Sell at Glasgow Show

GLASGOW, Feb. 10 (*by mail*)—The third post war Scottish automobile show here was one of the most successful ever held in Scotland. There were 230 exhibits with gasoline cars, gasoline trucks and one battery truck, as well as motorcycles, runabouts and a fair variety of accessories.

The American display, especially of trucks, was not so numerous as that at recent shows, but even more noteworthy was the absence of any steam truck or land tractor.

Generally speaking, sales were poor, but there were some inquiries for certain classes of light cars and motorcycles.

NEW GILLETTE PRESIDENT

EAU CLAIRE, WIS., Feb. 20—F. C. Hermann of Springfield, Mo., one of the heaviest stockholders in the Gillette Rubber Co. of Eau Claire, Wis., has been elected president of the corporation. R. B. Gillette continues as vice-president and general manager. L. A. Fosse of Chicago, who has been in charge of affairs in behalf of a bankers' committee for the past year, has relinquished his duties. Mr. Hermann recently disposed of most of his extensive business interests at Springfield to retire to California to live, but he has changed his plans and will take an active part in the management of the Eau Claire concern.

Trade in India Lost by English Makers

American Motor Vehicles Gain Supremacy—High Fuel Price Checks Sales

LOS ANGELES, Feb. 20—The extent to which the United States has displaced Great Britain as a supplier of motor vehicles to India is shown in the latest official statistics announced during the recent motor exhibition held in Calcutta under auspices of the Motor Trade Association, Eastern India Section. The year before the war 2800 motor cars were imported into India, of which 1669 came from Great Britain. In 1920-21, a total of 15,432 motor vehicles were imported into India, of which only 2541 came from Great Britain and 10,120 from America.

While the display of American cars at the Calcutta show could not be described as comprehensive, there nevertheless was a good American representation. The automobile manufacturers of Great Britain, who are now making a vigorous effort to regain trade lost to America, were well represented.

Aside from the lack of good highways, the chief obstacle to the development of the automobile trade in India is the high price of gasoline. During the month of December, the average price per gallon stood around 75 cents. India is largely served with fuel from Burma.

In speaking of the fuel price situation in India, the *Times* of India (Calcutta) said:

"The only avenue of escape is the provision of an alternative fuel, such as benzol, if necessary under a purely official agency. If the price of gasoline can be lowered and the road system is improved we would have only touched the fringe of the use of the internal combustion engine in India. The plain fact is that the bullock, which was always inefficient, has ceased to be economical."

Taxes in Philippines to Maintain Roads

LOS ANGELES, Feb. 20—A substantial increase in the tax on automobiles and a special tax on tires and gasoline in the Philippine Islands will soon be placed in effect, according to a scheme worked out by the governor general, the secretary of commerce and communications, and the director of the bureau of public works.

The primary object of the increases, according to information received here, is to provide a permanent fund for the maintenance of roads and bridges in the Philippines. It is hoped to make the highway system almost self-sustaining and virtually independent from annual appropriations by the Philippine legislature.

The plan calls for a complete revision of the motor vehicle laws.

Full Data Submitted in Transport Survey

Great Care Indicated in Report Made by Industry to Agricultural Commission

WASHINGTON, Feb. 21—Reports on motor truck transportation and highways were submitted to the transportation section of the Joint Commission on Agricultural Inquiry, to-day, by a sub-committee composed of representatives of the automotive industry and highway departments. The complete data will be held as confidential until the publication of the Commission's report on transportation, in April.

Analyze Traffic in States

One of the most interesting features of the report filed by the sub-committee is the analysis of motor truck traffic. in Maryland, Connecticut, New York, Tennessee and California. The Bureau of Public Roads conducted these traffic surveys and has just completed a study of highway transportation in Connecticut. The data, when it is made available, will show the volume of motor traffic on one of the principal highways leading into New York City.

Tables covering the type and weight of vehicles, percentage of overload, speed, kinds of tires, horsepower, character of commodities, and other phases of the motor traffic question, will be exhibited. The information represents months of study by representatives of the Bureau of Public Roads, in co-operation with officials of the State Highway Department of Connecticut.

A considerable portion of the data now in possession of the Congressional Commission has been published from time to time by the National Automobile Chamber of Commerce and other organizations. The Joint Commission is particularly desirous of knowing in its study of physical property the number of passenger cars and the aggregate investment represented; commercial trucks; number of private and public, separately classified as to heavy and light weight, and amount of investment in each instance; also capacities of these trucks in tons and the horsepower of each class in the years 1912 to 1921.

Highways Studied

The study also includes public highways, mileage, streets, whether paved or dirt, etc. Information was given as to the total number of highways, and total investments, and investments by individual states, and the cost of maintenance. The Commission received data as to express transportation and, in the analyses of physical property, wanted to know the total equipment and investment, as represented by motor vehicles and horses, separately owned by express companies during the years of 1912 to 1921, and the investment in each item.

In a detailed study of motor transportation the data submitted covered a study of traffic by passenger and commercial cars. The information is given as to the number of passengers carried by passenger cars. The use of commercial cars was divided into private and public. There was a discussion of private operation, distribution of commodities, and the extent of urban or other deliveries by this means. The report covered public operations and lists of commodities and number of passengers handled and rates, together with the classification of commodities as to industrial products and others. Whenever possible, information was obtained to show the revenue of motor carriers and the effect on less than carload lots freight of rail carriers.

As to public trucks, the research included commodities, persons employed and carried, and the percentage of rates; industrial products and other commodities; and the total amount of revenue derived. The analyses of operation included both passenger cars and trucks. Under passenger cars were included maintenance costs, tires used and cost, amount of gasoline and oil consumed, and cost of oil and gasoline used.

Considers Farm Product Distribution

Another study was made of the effect of motor trucks on the distribution of the various commodities, particularly grain, hay, green fruits, vegetables, cotton, sheep, cattle, dairy products, hogs, poultry and coal. Information was given as to co-operative transportation rates by rail, water and motor, and the radius covered by motor trucks in distributing farm products.

Committees representing shipping interests have been at work for several weeks throughout the country, and through the medium of questionnaires have obtained basic information for analysis by the Joint Commission. An Advisory Committee will consider the data on motor transportation this week and determine their conclusions for the report and recommendations to be submitted to Congress.

The study of the economic relationship of agriculture and industry is not confined to farm products, but covers manufactured commodities as well.

The study of finances of motor transporters embraces organization, capitalization, profits, dividends and receiverships. Under the designation of Government regulations of transportation systems, the study of its effect on motor transportation is confined to good road amendments and the number in effect in the various states. There is also a discussion of state regulation of motor truck companies and private bus lines.

To Discuss Store-Door Delivery

The question of store-door delivery of l.c.l. freight by carriers will also be discussed by the Commission in its report, which will cover the subjects of cost, advantages, disadvantages, necessity for such practice and reasons for adoption.

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Commerce Prepares for Big Production

Its New Model Adapted to Special Service for Transfer Work

DETROIT, Feb. 18.—Commerce Motor Car Co. is preparing for heavy production in the spring of its Charabanc model, first shipments of which have been under way for three months. A dealer convention will be held during the coming week at which orders covering almost all sections of the country are expected to be placed.

The Commerce Charabanc is a ten-passenger vehicle with four rows of seats. The body is equipped with two sets of curtains, one set of storm curtains for use in warm, inclement weather, the other fitted with crystal glass, constructed to open with doors for use in cold weather. The top is of permanent construction and can be removed as a unit or folded back.

Chassis is of 127-in. wheelbase and the specifications include disk wheels, 35 x 5 cord tires front and rear, Continental engine, Timken axles, thermo-syphon cooling, Eisemann magneto and Brown-Lipe transmission. The body is of sheet steel with three doors on each side. The price is $2,350 f. o. b. Detroit.

Special Service Urged

Factory plans will urge the adoption of the charabanc for special services in which touring cars are too small and buses too large. Depot and hotel transfer work and service on general passenger transportation, both in small cities and large, will be its principal field.

DORRIS ADDS 1-TON TRUCK

ST. LOUIS, MO., Feb. 20—The Dorris Motor Car Co. has added a 1-ton model to its line of trucks, this being shown for the first time at the automobile show in this city. The new model is known as K-2 and has a 4-cylinder engine, 4x5½, valves in the head, multiple disk clutch, Bosch magneto and Westinghouse starting and lighting system. The wheelbase is optional at 120, 138 and 150 in. Cord tires, 33 x 5 in., are used all around.

NEW DAVIS MODEL

RICHMOND, IND., Feb. 20—A new Model 71 has been added to the Davis line and will make its appearance March 1. It will be smaller in some respects than the Model 61-67 which is continued. The price is $1,195 as against $1,795 for the current model. The new model includes Continental 6Y engine, 3⅛x4¼ in. Timken axles, Delco starting, lighting and ignition. Stromberg carbureter, Warner gearset, Borg & Beck clutch, Peters universal joints and a Borg & Beck steering gear. The wheelbase is 114 in. For the present only the phaeton will be produced, but later a phaeton-sedan will make its appearance.

May Follow Ford Lead in Foreign Assembly

Overland Likely to Take Step in Britain, Ultimately Building Car There

LONDON, Feb. 10 (*by mail*)—Following the lead of Ford with his cars, trucks and tractors, it now seems probable that Overland and at least one other American maker of a popular car and light truck will soon begin the assembly of complete vehicles here, with the idea ultimately of having them produced entirely in England.

The Overland chassis has been assembled for some time at the Willys-Overland-Crossley Works near Manchester. This will be in line with the decision of Ford to have his products for the British and certain export markets built entirely at Manchester.

It is believed there is a substantial basis for reports that General Motors, Ltd., soon will follow in line and will concentrate its efforts at an assembly plant on the outskirts of northwest London. This company has just listed its Chevrolet light truck chassis at £190 and its four seated car at £260. There is a tariff of 33 per cent on cars and parts imported from the United States, but the duty on Canadian imports is very small. There is no duty on trucks and truck parts irrespective of their origin.

Austin Creditors Meet

Following the recent statement that financiers had offered to supply $1,000,000 additional working capital to the Austin Co., a meeting of unsecured creditors was held to consider the company's future. It was stated that the debts exceeded $5,000,000. The addition of the new money, it is estimated by Sir Herbert Austin, would give a total of $4,250,000 as work capital in stock, cash and accounts receivable before the end of March.

Dunlop Financing

The report of the stockholders of the Dunlop Rubber Co. states that the corporation's holdings in the Dunlop Tire & Rubber Corp. of America have been increased from 92.34 per cent to 96.34 per cent, but it is added that "so far no definite arrangement has been possible for the permanent financing of the American subsidiary company."

S. T. D. Net Profit $756,910

The S. T. D. (Sunbeam, Talbot and Darracq) motors report as of Sept. 30 shows a net profit of $756,910, to which has been added $288,720 brought forward. After deducting 7 per cent dividends, there remains a credit of the profit and loss account of $701,305.

Site Base of Ford Suit

The Ford Motor Co. of England, Ltd., has filed a claim for $64,020 against the Southampton Corp. for its failure to turn over the site upon which an addition to the English plant was to be erected at Millbrook, designed to turn out 1000 cars a week. It was proposed to spend $1,750,000 on the factory, and the claim is to recover money disbursed during the negotiations.

PRINCE OF GEORGIA BUYS FARM MACHINERY

MOLINE, ILL., Feb. 18—Prince Adaschidze of Georgia, an independent Balkan province, has spent a week in the Moline Plow Co. plant, purchasing supplies and interesting officials in establishing agencies there. Machinery is almost exhausted, he said, and the people who look forward to early revival of their agricultural pursuits will offer a wide market for American made goods.

Georgia, recognized by many European governments, although not officially so by the United States, established its unity with the collapse of the Romanoff dynasty. Adaschidze is member of one of the old eastern European families and was a member of the Czar's personal bodyguard.

Earl Financing Program Approaches Completion

DETROIT, Feb. 22—Clarence A. Earl, president of Earl Motors, Inc., said today that only the details of the new financing program remain to be worked out and that everything should be arranged this week. The company will be well provided with operating funds until the program is carried through. Production is now running at 20 cars a day, he said, and will be increased next month.

Ira L. Bell has been appointed division sales supervisor of the mid-west territory for Earl Motors. Further increases will be made in the field forces of the company.

North Carolina Advances In Its Road Building Plans

RALEIGH, N. C., Feb. 20—High water in the records of road construction for the United States will be sought by the State highway commission this week when twenty-three projects approximating 160 miles of new construction will be awarded. Bids will be opened in the hall of the House of Representatives and more than 200 proposals are expected.

Within less than six weeks of the decision to make awards on 1000 miles of road during the calendar year, the commission will have let more than 20 per cent. The total cost of the work for which bids will be received this week will reach more than $2,000,000.

Republic Cancels Many Commitments

Creditors to Continue to Supply Factory—Attempt at Adjusting Defaulted Bond Issue

CHICAGO, Feb. 21—After a meeting held here by merchandise creditors of the Republic Motor Truck Co., the announcement was made by Charles M. Gillett, vice-president of the First National Bank of Chicago and a member of the bankers' committee in charge of the truck company's affairs, that commitments for materials aggregating $2,500,000 had been canceled. He stated that the creditors, without exception, had accepted the situation in the finest spirit and were willing to take long time notes in payment of present debts. They also will be willing, he stated, to supply the factory with materials and parts as needed.

According to Gillett, there is only one possible source of trouble at this time and that is a suit filed on a commitment for axles by Frank W. Ruggles who formerly was at the head of the Republic company and who still owns a large block of stock.

The bank committee now is attempting to adjust a $500,000 note issue which was defaulted in November. More than $325,000 of this issue is now held by the banks. Agents are in the field taking up these notes as rapidly as possible and it is expected that the whole issue soon will be in the hands of the bankers.

The bankers have agreed to furnish $250,000 in cash to the company as soon as the notes are no longer a possible source of trouble. The company has $2,525,000 in excess of liabilities and Gillett asserted that its future was assured provided an adequate volume of business could be found to keep the plant in operation.

Portland Trade Better Since Holding of Show

PORTLAND, ORE., Feb. 21—The automobile business in Portland and vicinity has shown decided improvement since the annual automobile show, held the last week in January, according to practically all the leading dealers of Portland, and the general situation at the present time seems more hopeful for a strong resumption of business than it has for months.

Leading automobile men, almost without exception, report that both in general interest shown and in actual sales the present period is leading the similar period of last year by a substantial margin. While figures for all the dealers together are not yet available, practically all the leading dealers report they have sold more new cars at retail this January than they did in January, 1921, while February this year is also expected to exceed February of last year. This is in spite of unsatisfactory weather.

Ford Tractor Cut Surprises French

Fordson Lowest Priced in Capacity—Experiments With Heavy Oils

PARIS, Feb. 12 (*by mail*)—Ford threw a bomb shell into the agricultural tractor world by selecting the opening of the Government agricultural show in Paris, to announce a reduction in the price of his tractor of from 12,000 to 8,200 francs which is equivalent at present exchange to $715. This makes the Fordson by far the lowest priced tractor of this capacity on the French market, even if account is taken of the State subsidies granted to French makers.

The exhibition, in the Grand Palais, was the first of its kind held by Government initiative. The show was open to all classes of agricultural machinery, but tractors, farm trucks and stationary power plants produced by automobile firms were an important feature. French automobile firms paying real attention to agricultural requirements are Renault, De Dion-Bouton, Latil, Delahaye, Delaunay-Belleville, Peugeot, Brasier and Scemia, an auxiliary of the Paris omnibus company. Agricultural implement manufacturers producing tractors are in a minority.

Owing to the shortage of space, few trucks for farm use are exhibited in the Palais, although several are being demonstrated outside the hall. One of the novelties is to endeavor to adapt portable gas producers to existing types of farm trucks or to tractors for road service. Several of these are on exhibition on Latil, Pavesi and other tractors.

Peugeot is exhibiting the Tartrais two-stroke direct injection heavy oil engine for truck and tractor service. In addition to this, the same engine is shown on the Scemia stand.

Another attempt to run an ordinary type engine on heavy oils is the Maroger adapter, shown on a Samson tractor, for which important claims are made. This apparatus consists of a small cast bronze auxiliary combustion chamber with radiator fins mounted in the spark plug hole of each cylinder. This chamber has an automatic valve and carries the spark plug. A small carburetor with a separate gasoline tank is connected to these supplementary combustion chambers by a common manifold.

PREMOCAR PRICES LOWERED

BIRMINGHAM, ALA., Feb. 22—The Preston Motors Corp. has announced a downward revision in its prices as follows:

	Old Price	New Price
Roadster	$1,295	$1,095
Touring car	1,295	1,095
Coupe	1,945	1,750
Sedan	1,995	1,825

DAVIS REDUCES PRICES

RICHMOND, IND., Feb. 20—The George W. Davis Motor Car Co. announces reductions of from $200 to $500 in the prices of its various models. The schedule follows:

	Old Price	New Price
5-passenger Touring	$1,795	$1,595
4-passenger Touring	1,895	1,695
Sedan	2,595	2,195
Coupe	2,595	2,095

WARD LA FRANCE REDUCES

ELMIRA, N. Y., Feb. 20—The Ward LaFrance Truck Corp. announces substantial reductions on its truck chassis prices. The schedule follows:

	Old Price	New Price
Model 2B—2½-3½ ton	$3,590	$2,990
Model 4A—3½-5 ton	4,690	3,990
Model 5A—5-7 ton	5,590	4,590

LIVING COST TAKES DROP IN SYRACUSE

SYRACUSE, N. Y., Feb. 20—The Industrial Relations department of the Franklin Automobile Co., in a study of the cost of living in this city, as of Feb. 1, reports a net decrease of 3.7 per cent since the last report was taken on Nov. 1. An analysis of the budget shows that living costs up to the latter date had increased 63.09 per cent over the base year 1914, while the November study shows an increase of 68.67 per cent.

Every item in the budget shows a decrease with the exception of shelter which held constant.

Templar Raises Price of Its Three Models

CLEVELAND, Feb. 23—The Templar Motors Co. announced to-day the increased prices which will be charged for its various models after March 6. The schedule follows:

	Old Price	New Price
Roadster	$1,985	$2,025
5-passenger Touring	1,985	2,125
4-passenger Touring	1,985	2,175

MASTER TRUCKS LOWER

CHICAGO, Feb. 23—Substantial price reductions are announced by Master Trucks, Inc. The list follows:

	Old Price	New Price
Model JW 1½-ton	$2,690	$2,290
Model W 2½-ton	3,290	2,890
Model D 2½-ton	3,540	3,190
Model A 3½-ton	4,190	3,990
Model E 3½-ton	4,640	4,290
Model B 5-ton	5,290	4,990
Model F 5-ton	5,440	5,090

FORD WORK STARTS SOON

TROY, N. Y., Feb. 17—Engineers representing the Ford Motor Co. state that the new Ford tractor plant at Green Island will be started by the contractors about May 1, and that power in the recently completed power house will be turned on a month later. Village officials of Green Island are making preparations for the growth which is expected to follow development of the Ford plans here.

Road Work Starts In Latin-America

Need for Transportation Leads to Ambitious Highway Programs

NEW YORK, Feb. 21—In many sections of America, both north and south of the equator, important progress has been made in getting under way extensive programs for highway improvement, made necessary by the demands for adequate transportation. Much work was completed or initiated in 1921 and much more is planned for further construction so that, it may confidently be expected, the year 1922 will witness the betterment of a large mileage of roadways.

This is a significant manifestation of the growing use of automotive equipment and shows, in a striking manner, the strides being made in the economic development of numerous rich and growing territories. Interest in highway improvement has become widespread and already much of this interest is translating itself into actual road construction.

Seek to Overcome Obstacles

Attention may well be directed to the efforts being made in several countries to overcome the highway difficulties. The countries concerning which mention might be made are Argentina, Brazil, Chile, Mexico, Peru and Venezuela, among others in various parts of the world, which are seeking to build up systems of roads that will adequately serve the internal needs for modern communications. In each of these, much road improvement has either been started or is in process of organization.

Argentina will hold in May the first national highway congress, at Buenos Aires, to be attended by representatives from all parts of the republic, with governmental officials, to lay out a national plan for highway improvement. In addition, Argentina has undertaken the betterment of parts of the route of the coming international motor race from Valparaiso to Buenos Aires, through Bahia Blanca; and several of the interior states are energetically pushing their road programs. The mileage of good roads in some parts of Central Argentina would surprise many a visitor who had previously formed his impressions concerning the highway situation and it is needless to say that such roads, once started, will be completed in line with the transportation needs.

Chile Going Ahead

Chile likewise is improving sections of the transcontinental race route and some months ago passed new road laws, appropriated considerable sums for highway improvement and much work already has been done in various parts of the republic.

To tap the rich resources that have been dormant or which have scarcely

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Road Work Starts In Latin America

Need for Transportation Leads to Ambitious Highway Programs

(*Continued from page* 491)

more than been scratched, road work is being pushed rapidly in many sections of Brazil. A survey of Brazilian highway progress made in Rio de Janeiro, estimates that 1000 kilometers of motor roads were completed in various states during 1921. The most important project finished during the year was the Sao Paulo-Campinas highway, and there was various other work in the State of Sao Paulo, including the beginning of a national highway to connect the city of Sao Paulo with Rio de Janeiro.

Brazilian motorists have long held the hope that a worthy highway would be built between their two largest cities and that project seems now in process of fulfillment. With the centennial celebration to be held in the latter part of this year, Brazilian representatives are announcing that the Rio-Sao Paulo highway will be completed in time so that motorists may tour between these two great cities along a route that will be among the most wonderfully scenic and picturesque in the world. Work already has commenced, with many kilometers completed, on that part of the route in the State of Sao Paulo and, with the construction pushed from the opposite end, the Brazilians and their numerous visitors may whirl along the new highway as they celebrate the 100th anniversary of their independence.

Improvements in Interior

The interior states of Brazil, as well as those far to the south, have not overlooked the necessity of motor transportation and the survey shows numerous improvement projects under way or already completed. Thus, numerous rural bus and automotive transportation lines have already been established and in certain interior sections, the traveler may visit many towns and traverse hundreds of kilometers via bus lines that furnish the transportation not provided by railroads. A concession for construction of the much needed highway between Lima and Callao, the port city, has recently been granted in Peru. Work must start within a few months and be completed without delay, the road to be hard-surfaced and to be well enough built to uphold the heavy trucking traffic between the capital and its outlet on the Pacific. This is the most important highway project now under way in Peru but others are contemplated.

Venezuela is taking advantage of her natural riches and is seeking to link up interior points, where the various products originate, with outlets on the Atlantic so that they may be shipped throughout the world.

What all of these countries are doing, finds its counterpart in Mexico. That large republic, realizing how much the future is dependent upon adequate transportation, has commenced work on a great road plan, embracing nearly 7000 kilometers of highway and opening up a great transportation net. Twenty-nine different projects have been put before the Mexican Congress and action on some or all of them may be expected.

Mexico, perhaps, was somewhat slower, due to internal conditions, than other countries in commencing the development of automotive transportation and with it, the attendant development of highways.

N. A. C. C. Will Receive Plans for Overseas Trade

NEW YORK, Feb. 23—Following the appointment of a committee on organization, headed by A. S. More, president of the Denby Motor Truck Co., Detroit, the plans for a combine for foreign trade will be placed before the executive meeting of the National Automobile Chamber of Commerce here on March 2. The plan, which provides for co-operative effort in developing the overseas trade in automotive equipment, was announced at the annual export meeting of the Chamber in January.

The organization committee, in addition to Chairman More, includes B. C. Budd, export manager for Packard; E. G. Poxson, export manager for Dort; E. W. Headington, export manager for Haynes, and E. J. Ross, of the Ward Motor Vehicle Co. A carefully prepared booklet setting forth the combine plan is being mailed this week to all N.A.C.C. members.

Bank Creditors Submit Willys-Overland Program

NEW YORK, Feb. 23—Bank creditors of the Willys-Overland Co. have submitted their refinancing program to the Toledo directors elected last week for 30 days' examination. This would seem to indicate that the bank loans which mature March 1 will be renewed for at least a month. It is understood that two more Toledo directors may be appointed soon. The outlook now is said to be more hopeful for a satisfactory adjustment of conflicting viewpoints of the various interests involved.

FILES LIEN AGAINST WILLYS

ELIZABETH, N. J., Feb. 20—Paul L. Batty, who designed and supervised the construction of the Willys Corp.'s plant in this city, has filed a mechanic's lien for $42,379.36 against the corporation, covering fees he claims due him for designing the structure and supervising its construction from Sept. 1, 1919, Nov. 25, 1921. The lien sets forth that Batty was to receive a fee in addition to his salary for the work he performed and that his contract was made personally with John N. Willys, president of the corporation.

21,820,041 Casings Produced in 1921

December Showed Increase Over November With Greater Gain in Shipments

NEW YORK, Feb. 23—Production of pneumatic tire casings for 1921 totalled 21,820,041, according to statistics supplied the Bureau of Foreign and Domestic Commerce by the Rubber Association of America, with the figures for December not entirely exact. The estimated production for December was 1,840,000, an increase of about 100,000 over November, but shipments were 1,980,000, as compared with 1,342,519 in November. Inventories fell off about 200,000.

Tube Production Declines

Inner tube production in December was 2,070,000, as compared with 2,126,211. Shipments of inner tubes in December increased nearly 1,000,000 over the previous month, however, while inventories were reduced from 5,203,000 to 4,731,000.

Detailed figures for the year as compiled by the association follow:

PNEUMATIC CASINGS

	Inventory	Production	Shipments
Jan.	5,319,605	703,430	965,417
Feb.	5,193,018	819,892	1,073,756
Mar.	4,597,103	1,163,314	1,614,651
Apr.	4,527,445	1,651,418	1,785,951
May	4,451,668	2,100,917	2,085,882
June	4,154,456	2,313,265	2,643,850
July	3,892,037	2,570,524	2,757,581
Aug.	3,934,853	3,043,187	2,894,442
Sept.	3,340,798	1,929,268	2,047,929
Oct.	3,545,030	1,928,271	1,675,169
Nov.	3,908,342	1,756,555	1,342,519
Dec.	3,697,000	1,840,000	1,980,000

INNER TUBES

	Inventory	Production	Shipments
Jan.	5,586,163	740,824	1,042,617
Feb.	5,415,464	916,627	1,129,881
Mar.	5,044,861	1,346,483	1,643,690
Apr.	4,916,772	1,762,122	1,983,571
May	4,751,880	2,210,040	2,342,567
June	3,835,098	2,359,928	3,232,673
July	3,122,815	3,020,981	3,603,248
Aug.	3,649,319	4,430,152	3,804,060
Sept.	3,827,830	3,274,822	2,645,758
Oct.	4,732,016	2,843,918	2,016,371
Nov.	5,203,568	2,126,211	1,540,299
Dec.	4,731,000	2,070,000	2,523,000

SOLID TIRES

	Inventory	Production	Shipments
Jan.	303,753	21,220	29,116
Feb.	304,374	23,365	29,599
Mar.	283,800	28,710	43,926
Apr.	269,985	28,859	42,080
May	264,633	35,156	40,122
June	240,336	28,395	49,867
July	220,003	35,123	55,678
Aug.	216,367	55,694	66,866
Sept.	161,832	37,441	50,276
Oct.	163,299	46,274	45,911
Nov.	173,451	43,537	34,556
Dec.	169,000	40,000	40,000

"Production" and "Shipments" figures covers the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" include only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

MEN OF THE INDUSTRY

Jerry Price has resigned as works manager of the Willys-Overland Co., on account of ill health, and will leave soon on a trip to Central America. Price has been at the Toledo plant for about two years.

J. C. L. Krebs, formerly identified with the Clydesdale Motor Truck Co. of Clyde, Ohio, has organized the Krebs Motor Truck Co. which proposes to establish a plant at Bellevue, Ohio.

R. S. Jemison, formerly advertising manager and sales promotion manager of the Oldfield Tire Co., Akron, has joined the forces of the United States Advertising Corp. at Toledo. He was at one time connected with the Miller Tire Co.

J. H. Ficken has joined the Howe Rubber Corp. as special sales representative. He has had a long association in the rubber industry being at one time with the United States Tire Co. and latterly with Kelly-Springfield.

Leonard Kebler, president of the Ward Leonard Electric Co., Mount Vernon, N. Y., has sailed from New York on the Adriatic for a three months' combined business and pleasure trip through the Riviera, Egypt, Italy, France, Switzerland and England.

Emmett L. Page has severed his connection with the Oakland Motor Car Co., with which he has been associated for the last 11 years. For the last year he has acted as superintendent of the engine plant and prior to that served as assistant factory superintendent.

C. F. Tolizien, factory manager of the Packard Motor Car Co., has resigned to devote his attention exclusively to the business of the Plywood Products Co., Wayne, Mich., of which he is president and which he organized two years ago. The Plywood company manufactures steering wheels.

John N. Willys is making a country wide tour of Willys-Overland branches and distributors, his trip taking him to New York, Philadelphia, Chicago, Jacksonville, Fla.; Kansas City, Denver, Portland, Ore.; Seattle, Spokane, San Francisco, Los Angeles, San Antonio, Dallas, Memphis, New Orleans, Birmingham and Atlanta. Dealer meetings have been arranged at these points.

Full Data Submitted in Transport Survey

(*Continued from page* 489)

The report covers the substitution of other means of transportation for steam railroads and the necessities of commerce leading to such substitution. It deals with the radius covered by motors, electric railways and parcel post, and the participation of each in long haul and short haul traffic. There is a discussion of the proximity of markets and facilities to handle economies of distribution costs, separated as to freight and passenger, etc., and prospects for future development.

The Commission is also anxious to know the effect of motor and electric competition upon steam tonnage and the net earnings. The information which it has deals with the utilization of public highways by motors and electric railways through franchise, and the effect of operating costs upon such carriers. It is apparent that the report of the steam carriers and electric lines and motor transportation agencies will be at variance, and it will remain with the Commission to analyze the situation in its discussion of competition between the several modes of transportation.

One of the points that the Joint Commission is endeavoring to emphasize is the evolution of transportation and its effect upon, and interdependence with, the development of the country and its basic industries. It is generally believed that the report, when made public, will have a beneficial effect upon motor transportation and will show its developments and essentiality far more effectively than might be accomplished by private effort.

Ford Fixes 50 Cars Daily As Limit of Lincoln Output

DETROIT, Feb. 21—The following copyrighted interview with Henry Ford is carried by the International News Service:

"Some people seem to have the impression," said he, "as the result of the taking over of the Lincoln Motor plant that I intend to be sort of a bull in the china shop in the automobile world. They are wrong. In taking over the Lincoln plant, my son and I agreed before we started that we would restrict output. The Lincoln plant is now making fifteen cars a day. As orders are running, we could sell 200 a day. But we shall never make more than fifty Lincoln cars a day. Such are my present plans, and, so far as I know, they will not be changed I do not believe that any one man should dominate the automobile world. I have no use for a man who wants to go to Heaven without taking anyone else along with him."

"The rumors that connect your name with negotiations to buy the Wills St. Claire and other plants are not true then?" he was asked.

"Absolutely not a word of truth in any of them," he replied. "Nor is it true that I am negotiating for the purchase of any railroad. The one railroad I have is all I want."

SET DATES FOR OWEN SALE

WILMINGTON, DEL., Feb. 20 — Charles F. Ross, Robert Penington and James P. Harris, receivers for the Owen-Magnetic Motor Car Corp., have given notice that on March 7, 8 and 9 they will offer for sale the personal property of the company, comprising machinery, fixtures, automobile parts and materials. The sale will take place at Forty Fort, Luzerne County, Pa.

GAS FATAL TO DAN R. WALLS

NEW YORK, Feb. 21—Dan R. Walls, advertising manager of the Splitdorf Electrical Co., died suddenly at his home here Saturday after having been overcome by carbon monoxide gas when he went to his garage to take out his car. Walls had been with the Splitdorf company for several years and was widely known in the industry.

Wine Growers Have New Fuel for Cars

Practical Trials of Automobiles Running on Alcohol and Benzol to Be Held in France

PARIS, Feb. 11 (*By Mail*)—Following up the work of the National Commission entrusted with the task of finding a subtsitute for gasoline, an important group of wine growers at Beziers, in the south of France, announces practical trials of passenger cars running on alcohol and benzol for April 2.

Although the exact nature of the fuel has not yet been announced, for the technical commission is still carrying out experiments, it is more than probable that it will consist of 50 per cent alcohol and benzol. The competitors will be given a limited amount of fuel, in proportion to the piston displacement of the engine and the weight of the car. A distance of 150 miles will have to be covered at minimum speeds varying from 25 to 38 miles an hour, according to piston displacement, the winner being the one covering the distance, at the regulation speed, with the lowest consumption of fuel.

Problem Not Solved

While existing types of automobiles can be operated successfully on an alcohol-benzol mixture, the French technical commission does not consider the problem solved, for the various mixtures employed do not give quite the same results as gasoline, while many of them have injurious effects on metals. At the present time the Paris Omnibus Company is running all its motor buses on a benzol-alcohol mixture, the only real difficulty being that this fuel corrodes valve seatings and stems.

By a law passed in the French Parliament last year the Government has the right, at any time, to cause gasoline importers to mix 10 per cent alcohol with all fuel put on the market. This law has not yet been taken advantage of, but it gives the Government power, merely by the signing of a decree, to make the use of alcohol obligatory with gasoline. This will constitute the first step towards compulsory alcohol fuel.

DISCUSS STEEL PRACTICES

MILWAUKEE, Feb. 20—Reports on annealing, core practice, facing sands, furnace practice and pouring practice were made by operating heads of plants at a meeting of the Electric Steel Founders' Research Group held in this city. The group was formed about two years ago for the systematic prosecution of cooperative technical work which could be directly applied in improving the manufacture of steel castings. It includes the Electric Steel Co., the Ft. Pitt Steel Casting Co., the Lebanon Steel Foundry, the Michigan Steel Casting Co. and the Sivyer Steel Casting Co.

FINANCIAL NOTES

H. H. Franklin Manufacturing Co. reports that in the year 1921 it improved its position in the industry by moving from eighteenth to fifteenth place in number of cars sold and from thirteenth to ninth place in the value of cars sold. These figures do not include Ford. The value of sales was $22,280,000 against $27,864,000 in 1920. During the year 8548 cars were sold representing 81 per cent of 1920 sales and 93 per cent 1919 sales. It reports that its profits for the year will approximate $500,000 and that the average yearly profit for the past ten years has been $692,000. Preferred dividend requirements for 1921 were $268,000. In addition to preferred dividends, one dividend amounting to $140,000 was paid on common stock during the year.

Continental Guaranty Corp., New York, in its comparative statement of condition, shows that on Dec. 31, 1921, cash on hand, in banks and in trust, totaled $2,282,108.97, as against $3,115,222.16 on the same date the previous year; receivables, $7,545,732.09, compared with $10,870,261.40; investments, $910,-163.04, as against $309,432.10. The corporation's reserves were $165,434.16, compared with $219,595.45, and the amount due creditors, $7,463,643.25, as against $11,922,322.35. The surplus and undivided profits on Dec. 31, 1921, were $277,812.45.

Peerless Truck & Motor Corp. directors have declared dividends at the annual rate of $3, an increase of $1. Dividends are payable 75 cents quarterly, March 31, June 30, Sept. 30 and Dec. 31, to stock of record on the first of each month.

Federal Truck Co. showed on Dec. 31, 1921, surplus of $704,828, and assets of $3,532,325. Its sales were $3,268,467 and its net profit, $176,800 in 1921.

Manufacturers Maintaining Hold on Dutch East Indies

NEW YORK, Feb. 18 — Statistics giving the total imports of automobiles and trucks into Java during the first eight months of 1921, the latest period officially covered, show that American manufacturers continue to maintain their hold on the market in the Dutch East Indies. Of total imports of motor cars and trucks during the eight months in 1921 numbering 4597, the United States furnished by direct shipments 2552.

Europe sent a total of 492 cars direct to Java in the first eight months of 1921 as against a total of 152 in the first eight months of 1920.

Lower Prices in Peru Stimulate Business

LIMA, PERU, Jan. 31 (*by mail*)—Prices have fallen in Peru. The Dodge agents advertised a reduction; the Firestone agents announced lower prices. These reductions, which are sure to be followed by others, will increase automotive business. Already the Ford agent has advertised reductions on springs.

Turning to general business conditions, there is an increasing though not strong activity in building. After the centenary anniversary celebration of Peruvian independents last July, building fell off rapidly. It is now being slowly resumed.

The smaller number of ships arriving and departing from Peruvian ports reflects the general business situation. Compared with a year ago exports and imports are much less to-day. Compared, however, with a period of six months ago, say last August, at about which time the crisis came, the showing to-day is much more favorable.

The returns of the Lima clearing house for Jan. 1922 will show a slight improvement over the latter half of 1921. Cotton, copper, curry, rice and sugar are to some extent being exported.

Should the government succeed in getting a loan and should the loan be followed by an improvement in Peruvian exchange, automotive products could be offered at very attractive prices.

Brazil Wishes Tractors Operated by Alcohol

WASHINGTON, Feb. 20—The use of alcohol as a fuel for farm tractors is the subject of a special report just made by the agricultural implement division of the Bureau of Foreign and Domestic Commerce. The suggestion is made by George B. Bell, chief of the division, that American tractors using this fuel would find ready acceptance in Brazil. The statement says:

The use of alcohol as fuel by an American machine in the recent tractor demonstrations at Santa Cruz, Brazil, has aroused much interest in that country. The test was very successful, considering the fact that this machine had no carburetor especially designed for alcohol burning. An American manufacturer is planning to send to Brazil personnel and equipment to conduct an extensive experiment in the use of this fuel.

The cost of gasoline has been an obstacle to the wider use of motor vehicles and tractors in Brazil and this would largely be overcome by the use of alcohol, which is produced there at an extremely low cost, as a by-product of the sugar industry. The successful operation of American tractors using alcohol as fuel will undoubtedly be one of the biggest factors in the wider distribution of these machines in Brazil.

W. C. SARGENT DIES

MILWAUKEE, Feb. 20—William C. Sargent, for 22 years secretary and also a director of the Chain Belt Co., Milwaukee, died suddenly as a result of heart failure. He established many of the early business connections of the company, many of which are still among the company's jobbers. He was also a director of the Federal Malleable Co., West Allis, Wis. He was 75 years old.

R. H. STRICKLAND DEAD

NEW HAVEN, CONN., Feb. 20—Burton Hiram Strickland, from 1896 to 1901 secretary and treasurer of the Springfield Rubber Tire Co. and since then an officer of the New Haven Savings Bank, died at his home in this city, following an illness of several months. For a time and prior to entering the tire business, he was identified with Holcomb Brothers Co., carriage manufacturers.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

During last week call loans ranged from 4 per cent to 5 per cent, as compared with 4½ per cent to 5 per cent in the previous week. Increased ease developed in the latter part of the week, and on Thursday and Friday all loans and renewals were negotiated at 4 per cent. Fixed date funds were in rather liberal supply, but the market was inactive. All maturities from 60 days to 6 months continued to be quoted at 4¾ per cent to 5 per cent. Prime commercial paper also remained unchanged at 4¾ per cent to 5 per cent.

The Federal Reserve statement as of Feb. 15, 1922, showed an increase of $13,-311,000 in total reserves, of which the increase in gold reserves constituted $14,-702,000, offset by a decrease of $1,391,-000 in other legal reserves. Total earning assets showed a contraction of $11,-317,000, due to the following changes: total bills on hand decreased $53,807,-000, United States bonds and notes increased $15,714,000, United States Certificates of Indebtedness, exclusive of Pittman one-year certificates, increased $29,776,000. Total deposits decreased $1,022,000, while Federal Reserve notes in circulation increased $3,774,000. The reserve ratio rose from 76.1 per cent to 76.4 per cent.

The New York institution showed the following decreases: $4,860,000 in total reserves; $33,113,000 in total bills on hand; $2,366,000 in total earning assets; $16,966,000 in deposits. Federal Reserve notes in circulation increased $6,764,000, and the ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 81.7 per cent to 81.9 per cent.

Bradstreet's food index number for last week showed a gain of 2 per cent over the previous week, and a gain of 6/10 of 1 per cent over the corresponding week of last year. This is the first time since April 1920 that an increase has been reported over the year before.

The Department of Commerce has announced that the United States exports in January amounted to $279,000,000, which figure is the smallest reported since August, 1915. Imports at $216,-000,000 give an excess of exports amounting to $63,000,000, which in turn is the smallest (except December) since October, 1914.

On February 16, the Bank of England cut its discount rate from 5 per cent to 4½ per cent. The rate is now at the lowest it has been since July, 1914.

Last week May wheat was quoted at $1.42¾ per bushel, as compared with November's low of $1.03¼. May corn was quoted last week at 63¾ cents per bushel, as compared with the November low of 35½ cents. This rise in wheat and corn prices is of great importance to the Western farmers in particular, as it creates a stronger feeling of optimism in regard to the future grain prices.

INDUSTRIAL NOTES

U. S. Tractor & Machinery Co. of Menasha, Wis., has embarked upon a general expansion program following the assumption of the presidency and general management by J. M. Robinson, formerly of the International Harvester Co. and other large tractor and agricultural equipment manufacturing concerns. It is planned to start work early in the coming spring on the erection of additional machine shop and assembling units, and a new foundry, so that not only the output of tractors will be increased but provision made for producing a more extensive line of tractor implements and power farm equipment.

Velguth Metal Parts, Milwaukee, has been organized by Carl Velguth, for many years secretary and sales manager of the John Obenberger Drop Forge Co. It is understood that Velguth has acquired title to the patent for a new article of equipment for open and closed car bodies. He recently purchased the business, finished and raw materials and patents of the Acme Motor Parts Corp. at a receiver's sale. In connection with this, it is said that further manufacturing facilities have been acquired for the new company.

Mason Tire & Rubber Co., states that the new factory capacity available March 15 and doubling the output of the plant will be required as soon as completed. The company reports that sales for 1921 will approximate $9,000,000 compared with 1920 sales of $7,000,000 and it is estimated the net profit for the period will aggregate $600,000. The fabric mill at Quitman, Ga., will be placed on a 24-hour a day schedule and the output has been sold up indefinitely.

Bay Verde Machinery Co. of Green Bay, Wis., an extensive jobber of machine tools, wood and metalworking equipment, transmission supplies, etc., is establishing an automotive equipment department on a large scale. It will do a jobbing business and probably will also have a retail department for local trade. Green Bay is the jobbing center for a wide territory in northeastern Wisconsin and the southeastern part of the upper peninsula of Michigan.

Briggs & Stratton, Milwaukee, are about to enter production on a large scale on a new motor-driven type of horn. The horn incorporates a number of new features such as requiring no lubrication and a simplification of the electrial as well as the mechanical construction. Manufacturers have already been provided with sample horns. The company also is planning distribution through its 500 service stations.

Hupp Motor Car Corp. reports that January 1922 shipments were the largest for any January in the last fourteen years. More than four times as many Hupmobiles were shipped and sold as in January 1921 or twice as many as in January 1918 or January 1916 or three times as many as in January 1919. From a production standpoint the company reports that January was one of the biggest months the company has had.

Percy Christian & Co., London, England, has acquired the exclusive distribution in the British Isles, South Africa and France of the product of the Dayton Airless Tire Co., a subsidiary of the Dayton Rubber Co. Capt. F. G. Fraser of Liverpool, associated in the British company, has been conferring with executives of the Ohio concern.

Eagle Mfg. Co. of Appleton, Wis., manufacturer of the Eagle tractor, feed cutters, etc., has effected a considerable increase in its production, which has been at a minimum for some time past. In so doing it is arranging to establish several new lines of power farm operating equipment which it has been developing in recent years.

Medart Patent Pulley Co., St. Louis, announces the change of its name to the **Medart Co.** because of the expansion of its manufacturing activities. This does not indicate a reorganization of the company, or any change whatever in its policies or personnel.

Nebraska Tire & Rubber Co., Omaha, is in continuous operation and working at capacity, three shifts of men being used. The company reports that it recently sold half of its entire output for the year to a California tire dealer.

McMullen Machinery Co., Grand Rapids, has been appointed exclusive representative of the Diamant Tool & Manufacturing Co., Inc., Newark, N. J., for all the northern peninsula of Michigan and portions of the southern peninsula.

Canadian Steam Motors, financed by Canadian capital, has been organized to handle the Coats steam car for the western part of the Dominion. Headquarters are at Victoria, B. C.

Storm King Mfg. Co. of Omro, Wis., manufacturing winter tops, curtains and other protection devices for open passenger cars and motor trucks, has moved its plant and business to Hortonville, Wis.

Equipment Maker Starts Intensive Sales Drive

CLEVELAND, Feb. 21—Contending that this is the time for the manufacturer to replace inefficient and antiquated machinery and other equipment so as to reduce production costs to a point where he can secure himself against competition, Warner & Swazey Co., which makes scale machines used in the automotive industry, has inaugurated an extensive and intensive sales campaign.

In making its drive, the company is proceeding on the theory that confidence in the price of the product as well as in the material is a prime requisite to normal buying and is departing from the custom of making open quotation of its list of prices both now and at the time of the peak during the war. Heretofore quotations have been made to individual customers.

Dealers in Shanghai Organize After Show

WASHINGTON, Feb. 20—The pioneer motor show of China was held in Shanghai and was attended by practically every foreigner in Shanghai, about 12,000 in all, and by a like number of Chinese from the merchant and educated classes. Probably the most noteworthy result of the show is that it led to the formation of a permanent organization of automotive men in China.

Prior to this show there was no organization of any kind, a situation which delayed the development of the roads movement—the most important single factor in the promotion of motor car sales in this country. It is now planned to hold the show every year as part of an active merchandising program.

METAL MARKETS

CONSTANT shopping on the part of buyers and a disposition among the larger automotive consumers to apportion among a number of mills orders that in former years would have gone to one producer are not without effect on the steel market's tone. Although selling prices are little affected by the pains which purchasing agents take to afford all possible competitors an opportunity to quote on their requirements, this condition serves to take the wind out of the sails of those who look upon stationary prices as a sign that the market is becalmed and who are always ready to essay an advance as a means of lifting the market out of a rut.

On the other hand, producers are not disposed to make material concessions ever though consumers offer to increase tonnages. Here and there one hears of isolated instances of prices being shaded on some specialty to the extent of $1 a ton or so, but, as a rule, this is due to intense rivalry between two individual competitors and not to any general disposition to obtain business at any sacrifice. Considering prevailing production costs and the limited demand which acts as a bar to any worth while enhancement of operations, producers look upon present market quotations much in the light of an irreducible minimum. It would require the impact of some striking development, such as a sharp reduction in freight rates, to alter this situation.

Of course, distribution of steel orders over a certain number of mills, such as is practiced these days by the Ford Motor Co., which recently split a 1500-ton sheet order for frame and crank case stock into three parts, has the advantage of eliminating all necessity on the consumer's part to commit himself except on a neck-and-neck basis with his production schedules.

Pig Iron.—It remains to be seen whether the market will sustain the effort to advance the price for foundry and malleable to $20, which a large Middle West furnace interest has announced.

Steel. — Full-finished automotive sheets continue steady at unaltered quotations. Passenger motor car builders are continually sounding mills on sundry tonnages of ordinary sheets. Most of the actual buying, however, is in rather small tonnages. The sheet bar market is a shade firmer, but still somewhere between $28 and $29, Pittsburgh. Common steel bars are in routine demand at 1.40c. @ 1.50c., Pittsburgh base, and automotive demand is still predominant in cold-drawn bars at 1.90c. @ 2c., Pittsburgh base. The strip steel industry also continues to subsist chiefly on automotive orders, with most of the business placed ranging in extent from 50 to 100 tons, and the inside quotation on hot-rolled 1.80c. while the cold-rolled is held at 3.50c. Pittsburgh base.

Aluminum.—When it comes to bids of below 17c. for 98 to 99 per cent virgin ingots holders display considerable reserve, a recent bid of 16.50c. failing of immediate acceptance. Imported sheets are held at very close to the American producer's price.

Copper.—The American Brass Co. has announced a reduction of ¼c. per lb. in its base price for copper products and of ½c. per lb. in base prices on brass products, these reductions reflecting recent declines in copper and zinc. The freight rate on Lake Superior copper from Calumet, Mich., to New York has been reduced 33⅓ per cent, or ½c. per lb., equivalent to $200 per car lot. This restores the freight schedule in effect prior to Aug. 26, 1920.

Calendar

SHOWS

April 3-16—New York, Second Annual Electric Automobile Show, Showroom of the New York Edison Co.

FOREIGN SHOWS

Feb. 18-27—Brussels, Belgium, Ninth Exhibition of Agricultural Machines and Implements, Palais de la Cinquantenaire.

March, 1922—Santiago, Chili, Annual Automobile Show.

April 16-23—Mexico City, Annual Automobile Show, Auspices of the Automotive Division of the American Chamber of Commerce.

April 22-May 1—Prague, Czecho-Slovakia, Fourteenth International Automobile Exhibit.

May—Shanghai. Exhibition of Road Building Material.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

May 1-15—The Hague. Automobile Show, also Airplanes and Motorboats. Secretary, Spui 185, The Hague.

May 6-21—Scheveningen, Automobile Show.

May. 28-June 5—Prague. Motor Show. Hotel de Ville.

July 1-24—London (Olympia). Aircraft Exhibition.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Associcao Automobilista Brazileria.

Sept. 15-20—The Hague. Automobile Show.

Oct. 12-23—London (Olympia). International Commercial Vehicle Exhibition.

November—London (Olympia). Automobile Show.

Nov. 10-Dec. 19—Brussels. Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia). Cycle and Motorcycle Show. British Cycle Motors. The Tower, Warwick Road, Coventry.

CONVENTIONS

May 10-12—Philadelphia, Ninth National Foreign Trade Convention of the National Foreign Trade Council.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

June 26-July 1—Atlantic City, Twenty-fifth Annual Meeting of the American Society for Testing Materials, Chalfonte-Haddon Hall Hotel.

August 28 - Sept. 2—Detroit, National Safety Congress.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

S. A. E. MEETINGS

Detroit, Mar. 24, April 28, May 26.

Cleveland Reports Employment Greater

Automobile Industry Shows Largest Gain—Productivity of Employee Is Improved

CLEVELAND, Feb. 20—The labor relations committee of the Chamber of Commerce has made an employment survey and reports that industry as a whole is now running at a higher point than it has since the first of last May.

The most conspicuous gain made by any industry is that of the automobile manufacturers and parts and accessory makers who report they have increased the number of employees from 5,568 on Jan. 1 to 7,440 on Feb. 1. A year ago they had on their rolls approximately 5,500 employees.

The committee has accepted the number of employees as a fair basis for passing on the condition of the industry, at the same time the average factory has so adjusted shop arrangements that the productivity of the worker has been increased. Labor itself, under the highly competitive system that has sprung up, also has become more efficient in the last year, so that the automotive industry here is employing more men than it did a year ago and getting more out of the individual worker.

Another encouraging detail of the report is the gain that has been recorded in employees in the metal trades, which is the backbone of Cleveland industry. The gain in the number of employees is 6.4 per cent since Jan. 1.

FULTON'S LAST PAYMENT

NEW YORK, Feb. 20—The final liquidating dividend, amounting to 36 per cent, has been paid by the Fulton Motor Truck Co., which has been in the hands of a receiver since November, 1919. Total payments to general creditors amounted in all to 76 per cent. The preferred creditors were paid in full. All of the assets of the company have been taken over by the newly organized Fulton Motors Corp. of which Garvin Denby is president.

Franklin to Provide Financing for New Car

SYRACUSE, Feb. 23—Directors of the H. H. Franklin Co. decided to-day to issue 40,000 shares of no par value common stock at $50 a share and $3,000,000 of 7 per cent cumulative preferred stock with a par value of $100 to finance the production of the new Franklin four-cylinder air-cooled car. The plant which is to be erected will have a one shift capacity of 50 cars a day and a two shift capacity of 100 a day. A world wide sales organization is being developed on a 100 a day production basis.

N. A. C. C. DIRECTORS TO MEET

NEW YORK, Feb. 23—Directors of the National Automobile Chamber of Commerce will meet at headquarters here the morning of March 1. The motor truck committee will meet the afternoon of the same day. A meeting of members of the N.A.C.C., both passenger car and truck manufacturers, will be held Thursday morning. A separate meeting of motor truck manufacturers will be held in the afternoon.

HAWKINS ACKERMITE CHAIRMAN

PITTSBURGH, PA., Feb. 23—Norval A. Hawkins, a member of the advisory staff of the General Motors Corp., has been elected chairman of the board of directors of the Ackermite Co. of America which will market Achermite, a permanent amalgamation of lead and copper which is said to be the only self lubricating metal ever invented.

ACTON HEADS POWER

ST. LOUIS, Feb. 20—Leslie R. Acton has been elected president of the Power Truck & Tractor Co. William J. McGoldrick is vice-president, while Clare Acton is secretary and treasurer. Harold C. Goodwin is assistant secretary. The directorate is composed of the officers and John R. Barnes.

Government Files New Lincoln Claim

Says Company Owes $6,000,000—War Contracts Given As Explanation

DETROIT, Feb. 23—No explanation is obtainable here of the new claim for $6,000,000 filed by the United States government against the Detroit Trust Co. as receiver for the Lincoln Motors Co. which recently was purchased by Henry Ford for $8,000,000.

The only statement from Washington is that the claim arises out of War Department contracts. Neither Henry M. Leland, president of the motors company, nor Ralph Stone, president of the trust company is able to explain the claim. It was supposed that the recent adjustment made with the Treasury Department had cleaned up all the war time adjustment claims.

ITALY TO CUT TAXES

WASHINGTON, Feb. 20—After two years experience with prohibitive taxes on motor vehicles, the Italian government has realized that they not only are seriously handicapping the motor industry, but that the returns to the state are smaller than from the more moderate taxes in force prior to the war. As a consequence a technical commission representing the Department of Finance has decided on a 50 per cent reduction in the motor taxes on small and medium powered cars and motorcycles. It is proposed to abolish all taxes on electrics for five years provided the vehicles are of Italian make. There will be some reductions in the taxes on motor lorries.

TO DRIVE FIAT IN RACES

PARIS, Feb. 4 (*by mail*)—Carrying with him a 183-cubic inch Fiat racing car, Pietro Bordino sailed from Genoa this week for New York, with the intention of taking part in all the races on the Californian tracks and in the Indianapolis 500 miles speed contest.